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AMERICAN MACHINIST

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Rack Cutter Attachment for Gould & Eberhardt's Shapers.

The very useful shaper attachment shown on this page is designed to meet a want where the purchaser does not wish to invest a large amount in one tool, which could be used only for rack cutting, and would remain idle a large part of the time.

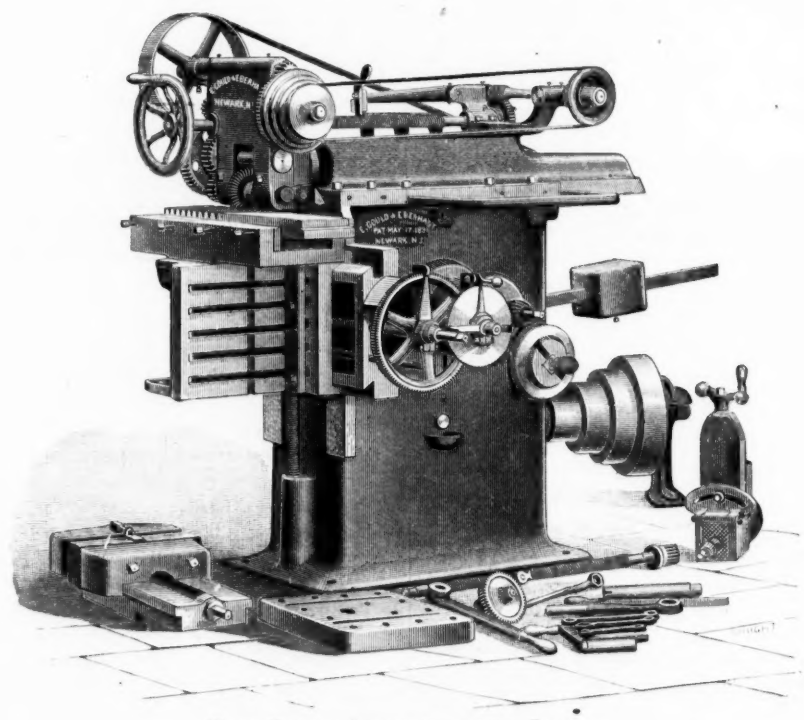
This is a regular tool for shaper work, and in a few minutes can alter it completely for rack cutting, and do it at small expense.

The cutter arbor is capable of admitting two cutters, side by side, one for blocking out and one for finishing.

The dividing mechanism furnished will cut either circular or diametral pitches, without changing any gears, and will divide to the one ten thousandth part of an inch.

The work is held in the vise or clutch made specially for holding racks to be cut, and the cutter is fed through automatically and is run back by hand wheel. Four changes of feed are obtainable for cutting various metals; all parts are well proportioned and well fitted.

This device is made to attach to E. Gould & Eberhardt's 15, 20, 25 and 30 inch shapers. The address of the firm is Newark, N. J.



RACK CUTTER ATTACHMENT ON A SHAPER.

Grate Bars and Their Uses.

A PAPER READ BEFORE THE NEWARK N. A. S. E.

BY F. B. ALLEN.

According to statistics, out of some sixty-nine million tons of coal mined in this country in 1880, probably over thirteen million tons were more or less perfectly burned under stationary steam boilers. As there is no detail of the furnace more important than the grate bar, perhaps we cannot spend the time at our disposal more profitably than by consideration of some of the principles involved in the design, construction and use of this important adjunct.

It has been suggested that the oldest form of grate bars may have been a row of bars laid upon beams and stones so as to admit air beneath the fuel in the intervals of the bars. While I have not ascertained who invented the grate bar, or when it was first used, something serving the purpose of grate bars are shown in the illustration of the Marquis of Worcester's invention of 1663. The illustration is not sufficiently clear to determine much concerning the shape of these bars nor other interesting details that would be valuable did we know them, and would assist materially in tracing the history of this useful article.

The grate bars of Savery's steam boiler in 1698 are more clearly shown, and in outline they are not unlike those of our day; there is also a dead plate, end bearing bar, and ash-pit, although history, if my recollection is not at fault, records that many of these improvements were made at a more recent date. We will not attempt to settle this question as the settlement is not important to our branch of the subject.

Though wrought iron grate bars have been used to some extent and very highly commended for their economy and durability, the use of cast iron bars in stationary boilers is so general as to be almost universal, and what is said herein regarding grate bars refers to cast iron ones, unless otherwise stated.

The weight of fuel alone on grate bars cannot much exceed 60 lbs. per square foot in any possible case. The weight of the load is not then an important factor. Practically, having provided the necessary air space, we dispose the metal and fashion the grate bars and bearers more to meet the possible strains of distortion due to a resistance to expansion when the intervening end and side spaces of the bars are choked with ashes, clinkers or other refuse, and to withstand the careless, sometimes reckless use of the fire tools when cleaning fires.

There are a variety of forms of grate bars in use; for ou present purpose we will simply classify them as the common bar, the air bar and the water bar, an excellent and durable form of the common bar being those with a narrow and deep section in moderate widths and short lengths, say not exceeding three feet long in ordinary furnaces and having as near as possible 50 per cent. of opening for the admission of air. The shape of these openings should be wider at the bottom than at the top, to lessen the danger of the air spaces becoming clogged with refuse and also to facilitate the flow of air. A short bar will warp less than a long one, and is less expensive to renew when it gets out of shape. Hollow air bars have been repeatedly tried and highly recommended, but they have not as yet had an extended use.

The water grate bars, invented in 1824 and since frequently applied to locomotives and marine boilers, do not seem to grow in popular favor, and are scarcely known in stationary boilers. The objections urged against them are the expense of maintenance, their fittings and attachments, and the possibility of serious consequences should they rupture or burn out.

The rocking or shaking bar is an excellent device for breaking up the formation of clinker and freeing the bars of ashes and other non-combustible products which accumulate on the bars, or in the interstices between them, obstructing the air passages, and by lessening the flow of air to the fire, lower the economy of the furnace. The possible saving in thus being able to keep the bars clean, over the too common way of opening the furnace doors at intervals, for the purpose of slicing or cleaning the fire—in which operation the temperature of the furnace is lowered to an extent, and for a time varying with the skill and celerity of the one who is doing the work—under ordinary circumstances is possibly ten per cent. of the efficiency of the furnace, some damage to the walls and adjacent parts, and any serious injury to those parts of the boiler exposed to the relatively cold currents of air which sweep over them at such times.

A consideration of the foregoing shows the theoretical advantages of the shaking or rocking bar; but practically—though realizing many of the advantages claimed for them—their use is attended with some trouble and expense, so that, while admitting the losses and disadvantages inseparable from the use of the common grate bar, a large number of engineers continue to use them.

The universal demand for cheaper power must hasten the introduction of improved forms of grate bars; and let us hope that the skill and ingenuity of our inventors may be further exercised, and produce a contrivance of the kind, so simple and inexpensive as to popularize it, and thus hasten its more general adoption.

Our best authorities agree that we need about 12 lbs. of air to effect the complete combustion of one pound of coal, but that, owing to practical difficulties in the way, it is better to arrange our grate bars, registers or other openings to the furnace, for a supply of double that amount, or 24 lbs. of air, per pound of coal. While it is indispensable to an economical consumption of coal that we have the requisite quantity of air, it is also agreed that whatever air passes through the fuel in excess of that amount is wasteful, but that between too little and too much air an excess is to be most desired.

There is a diversity of opinion as to what part of a furnace should be supplied with air to be the most effective. I do not think it so important where the air reaches the coal or the gases arising from it, as that the mixture be effected before the gases are reduced in temperature below the point of ignition, or about 800° Fah.

Careful determination of the temperatures, at various points from the furnace to the smoke-box, were made by the late J. C. Hoadley, at the Pacific Mills, Lawrence, Mass., in 1881. They were very instructive, and were as follows, for one of the boilers having a common setting; external air being 32°.

In the heart of the fire	2,493° Fah.
At the bridge wall	1,349 "
At pier	895 "
In smoke-box	378 "
Gases escaping to chimney	373 "

No flame in tubes.

The dimensions of the boiler used in these experiments were diameter 60 inches, length, 21 feet, and it contained sixty-five 3½ inch tubes 20 feet long. The coal used was that known as "Lackawanna" anthracite, egg size, of good quality, and reasonably dry. The average consumption of coal was 7.76 pounds per square foot of grate per hour. Though not pertinent to our subject, it may interest you to learn that under the conditions described, the average evaporation from and at 212° per pound of coal was 10.86 pounds, (equal to 13.24 pounds per pound of combustible.)

Those who believe that a tubular boiler should never, under any circumstance, exceed 12 to 14 feet in length, will not get much comfort from this experiment.

Assuming proper chimney proportions and a natural draft, the grate bar surface should be of such size as is required to burn the kind of fuel, and whatever quantity is needed to furnish the amount of steam required.

It is apparent to meet the foregoing conditions, the proportions of grate bars to heating surface will take a wide range; for instance, with coal of the ordinary size our most economical and efficient boilers have from 35 to 45 square feet of heating surface for each square foot of grate, while in burning wet tan, green saw dust, and some other refuse fuels not more than half that amount of heating surface can be successfully served by one square foot of grate, the successful burning of such fuels requiring the air to be in close contact and plenty of it.

By means of a natural draft in some cases,—in others it will require an artificial draft—screenings and other cheap fuels are burned successfully. It should not be forgotten that coal fuels are chiefly valuable in proportion to the amount of carbon they contain, and that often the refuse that is sold as fuel and thought to be cheap by the purchaser is largely composed of dirt and other non-combustible ingredients, and is often very dear in the end. Culm and other cheap fuels may be successfully burned, but under some circumstances it does not pay to burn them.

We burn our fuel in the grate bars, and the products of combustion are conducted over certain surfaces which absorb their heat. These absorbing surfaces are known to us as heating surfaces, and that arrangement of heating surface is the most efficient which with a high temperature in the furnace abstracts the heat of the escaping products of combustion so effectively that on their exit from the boiler to the chimney their temper-

atures shall not greatly exceed that of the temperature of steam within the boiler.

If in the case of the "Pacific Mills" boiler we assume that the losses in temperature at these different points, viz.: the bridge wall, the pier and the smoke-box, are indicative of the value of those parts as heating surface in this particular boiler, the value of those several parts might be expressed as follows:

The furnace,	2493 1340	= 54.5 per cent.	
	1153		
Shell back of bridge wall,	1340 895	= 21.1 per cent.	
	445		
	895		
The tubes,	378	= 24.4 per cent.	
	517	100	
Grate bars,	1153°	The value of the shell would be 75.6 per cent.	
Bridge,	445		
Tubes,	517	The value of the tubes would be 24.4 per cent.	
Escape,	378		
	2493°		

In this supposition the losses due to radiation from the brick-setting are disregarded.

In the centennial tests, Philadelphia, 1876, with a steam pressure of 70 lbs. and a sensible temperature of 316° in some of the most successful and best known boilers, the temperature of the waste gases did not exceed 411°. These temperatures were lower than ordinarily prevail in practice where we not uncommonly find the temperature of the waste gases escaping to the chimney as high as 700°.

Experience has taught us not only that the heating surface shall be suitably arranged, but that it is equally important that it bears a proper ratio to that of the grate surface to give an economical and efficient boiler.

With a good draft properly regulated by dampers, and a furnace 24 to 30 inches deep, I believe fires 6 to 8 inches thick will be found to give excellent results.

For externally fired boilers the designs of the Hartford Steam Boiler Inspection and Insurance Company generally provide a depth of 24 inches at the front of the furnace and 27 inches at the bridge. Some tubular boilers came under my notice a few years ago in which the distance from the bottom of the shell to the grate bars was but eleven inches. It may be needless to say the performance of these boilers was never satisfactory until the grate bars were lowered to a more suitable depth. Modern boiler setting has considerably improved on this as well as some other old time practices.

While there is a diversity of opinions among engineers regarding the management and regulation of fires in burning coal in stationary boilers—among your number are those whose experience and opinions are valuable, and I trust we shall have the benefit of them—permit me in closing to summarize ordinary experience on this subject about as follows:

That a moderately thick and hot fire with a rapid draft uniformly gives the best results.

That grate bars will last longer, and it is believed that combustion will be promoted by having a body of water in the ash pit.

That whenever practicable the damper should be closed before the furnace door is opened, and *vice versa*.

To remove one troublesome complaint that frequently causes grate bars to warp, have suitable space or clearance at each end of the bar; and grate bar bearers will prove more serviceable if they are placed a short distance from the end of the grate bar, leaving space so that whatever falls at the end may not lodge there. Some grate bar bearers are placed close up to bridge wall at one end and join the dead plate at the opposite end. As these places are most likely to accumulate ashes they speedily choke up if openings are not provided for their escape.

That by skill in firing a saving of 15 per cent. in fuel has been effected.

That under ordinary conditions with the usual sizes of coal it is better to fire a smaller quantity at shorter intervals than a larger quantity at longer intervals, and that in large furnaces by firing alternately to the right or left there will be less fluctuations in the furnace temperature, consequently a steadier steam supply than if the whole furnace be covered at once.

It has often been asserted and I think those most familiar with the work will be the least likely to contradict it, that the most successful smoke burner is a good fireman.

But in justice to the "other smoke burners," it should also be admitted that a good fireman is the exception, not the rule.

The advantage of a mechanical appliance for firing seems apparent when we consider that to accomplish the best results in burning coal, the fuel should be supplied to the grate in definite quantities, periodically, and it is probable that the fireman who is doing the most effective service for any one of your membership is the one who is working systematically with machine like regularity in discharging his duties.

While we recognize the skill and ability of a good fireman, we must not forget that the exercise of the same skill and ability produce widely different and more favorable results in a properly designed furnace than those obtained from one that is not. It will be found very interesting and instructive by those who are of an investigating mind to have sight holes about the furnace or connections through which the combustion of fuel and movement of the heated gases may be observed. Assisted by a few alloys or metals the fusing points of which have been determined, much information may be obtained regarding temperatures at various points between the furnace and chimney.

The comparative value of a row or cluster of tubes may be approximately determined by a simple plan described in *The Locomotive* a few years ago, viz: "A clean piece of soft white pine was placed at the front end of a boiler nearly in contact with the ends of the center row of tubes. It was fastened so as to maintain its position and left for several days. When examined it was found that the end of the stick in contact with the upper tube was burned to a coal and barely held together. At the tube next below it was a little less charred and the effects of the heat decreased towards the bottom."

Blast Furnace Statistics.

The *American Manufacturer*, of Pittsburgh, publishes a table showing the condition of the blast furnaces of the United States on January 1, 1887. In a condensed form, the table makes the following showing:

	In Blast.		Out of Blast.	
Fuel.	No.	Weekly Capacity.	No.	Weekly Capacity.
Charcoal.....	66	11,895	110	12,466
Anthracite.....	126	53,633	77	18,043
Bituminous....	140	80,132	69	29,937
Total	332	127,660	256	60,446

"As compared with one year ago, the production of charcoal iron in round numbers is 50 per cent. greater; of anthracite, 20 per cent. greater; of bituminous, 33⅓ per cent. greater."

The Pulsometer Steam Pump Company, 83 John street, New York, write us:

In response to your request, we are pleased to be able to report a largely increased demand for our specialty, The New Pulsometer.

The increase in our business during 1886, both domestic and for export, has not been spasmodic, but gradual and steady throughout the year.

We can attribute this to the fact, that the New Pulsometer is becoming better known, and that its superior efficiency is gradually but surely overcoming the prejudice, which exists against the Pulsometer of old style construction.

Skilled labor remains about the same as this time last year.

Material has advanced in cost, but no increase has been made by us in the prices charged for our product.

The Hoppes Manufacturing Company (Feed-Water Heaters and Purifiers), Springfield, Ohio, write us:

Although our company has only been in existence a little over six months, the orders for our feed-water purifiers are in excess of our capacity to turn them out, and we shall again enlarge our works, as soon as the weather permits. We are at present having considerable work done by outside parties, in order to get our work out in time. We send these purifiers out altogether on trial, and guarantee them to keep boilers clean and free from scale, which fact, no doubt, accounts in a great part for the large number of orders we have received, and we are glad to say they have not failed in a single instance to give entire satisfaction.

We have done nearly all our business so far by advertising, and we do not expect to put any one on the road until we catch up with the orders already on our books. Our outlook for the coming year seems very flattering.

John Lang & Sons, of Johnstone, Scotland, one of the best-known and most extensive establishments building machine tools in Britain, write us:

We have again the pleasure of remitting you annual subscription for the AMERICAN MACHINIST.

After a fair volume of business done during last year, we are starting the present year with splendid prospects for a good trade in our specialties viz., lathes and special machine tools, having already booked orders for several months ahead. We find the system which we have adopted in our works to be gaining favor with our customers, year by year, as well as giving ourselves greater satisfaction in every way, viz.: to furnish only first-class tools, having every modern convenience for manipulation of work with best possible finish, and at as cheap a price as can be produced with the employment of special machine tools. We have been assisted to a considerable extent in the development of our system and methods of production by the regular perusal of your invaluable weekly, where we have received many hints as to jigs, etc., comprising the experience of practical men who have themselves worked or superintended machines in actual operation.

Timothy Kieley, (Steam Traps, Pressure Regulators and Pump Governors), 11 West 13th street, New York, writes us:

As to the condition of my business during the past year, would say that I have experienced a steady increase, in fact my facilities for turning out goods have been taxed to the utmost, and I have already contracted for machinery that will enable me to turn out goods faster and better than heretofore. Business prospects in my line, for the coming year, seem A Number 1, and with the exception of a few drawbacks here and there, I expect a steady increase of business during 1887.

Making the Fog Useful.

(From the San Francisco *Argonaut*.)

Of all the queer devices pertaining to a seafaring life the queerest is the automatic fog bell that used to ring on Race Point, Cape Cod. There was a big bell with a clockwork that would mournfully toll it whenever it was set a-going. The bell was under cover, but projecting from the house was a long, nicely balanced lever with a big sponge on the out end. There was a little roof over the sponge to keep the rain off, but when a fog came on the moisture would saturate the sponge, and the weight bearing the lever down would start the machine and set the bell to tolling. If the fog soon disappeared the sponge dried out and the lever stopped the bell.

Report for which we are not able to vouch says that large size gas engines and a special plant for making the gas have been introduced into large works in Germany, with a material saving in coal as compared with steam engines.

Failures of Locomotive Crank Axles.

The *Mechanical World*, under the above heading, says:

On the Northern Railway, of France, during the five years 1881–85, there were 58 cases of breakage—one in the bearing, five in the web, and 52 in the crank-pin. Of these last 36 were in the right-hand pin, as against 12 in the left-hand pin, while four were not specified; and no satisfactory reason for this discrepancy has yet been assigned. During the same period 100 axles were condemned—93 for cracks, and seven for strained journals and other causes.

The above is significant, in view of the fact that it is very generally assumed, in Europe, that the reason why inside connected engines are not used in the United States is because American mechanics cannot make good crank axles. The bald statement seems to be about as good argument against their use as is needed.

Our contemporary suggests shrinking bands on the webs for strengthening the axles at these points. This is an excellent plan, fully demonstrated to be so in this country more than twenty years ago, when a good many inside-connected locomotives were in use.

A correspondent sends us a communication in which he favors putting slide valves in just as they leave the planer, claiming that as they spring out of shape when the pressure is on them, they will fit themselves better than they will if the valve and seat are scraped, so that the fit is accurate when the engine is cold and no pressure on the value. It is the practice of some engine builders to carefully plane valve and seat, and then do no further fitting, for an unbalanced slide valve, making the same claim our correspondent does.

This same correspondent also objects to the use of two valves instead of one. He says: "The two valves require just twice the power to operate that one does;" also that a valve, properly proportioned, "will cause a proper compression in the steam passages, so as to fill them with steam of steam-chest pressure when the valve uncovers the port to admit fresh steam; consequently, a large port will not waste one drop of steam. In other words, no matter how long or how large the ports are, with a valve that gives the proper compression, there is no waste of steam."

We are sure that if our correspondent investigates the matter further, he will see that it does not require twice the power to drive the ordinary double slide valve that it does to drive the single valve, because the two valves are not twice as large as the single valve. He will also find that the larger and long ports increase the clearance, and that, no matter what the compression may be, there is always a loss from clearance, which loss increases with the amount of clearance.

Deceptive Labels on Goods.

There is much complaint to the State Department that foreign made goods having American labels are sold widely in Europe, and are also brought hither to be palmed off on our own people. Certainly this is an evil; but there is a kindred abuse that is not less offensive to morals: it is the practice, not uncommon among American manufacturers, of putting French and English and German labels on goods made in this country. This is a thing for which there can be no excuse that is not offensive to propriety. If a man makes cloths or carpets, or any other articles which have good, honest stuff in them, and good, honest workmanship on them, he ought not to be ashamed; and, if he is not making honest stuff, the sooner he changes his course or gets into some other business, the better. The pretext, in such cases, usually is that the public prefer the imported stuffs and will not buy the home-made articles. But this is not true where the latter are well made. The American people almost universally prefer American carpets, because the latter are quite equal to those made abroad; and the only way to remove the lingering prejudice against domestic fabrics is to improve their quality and label them honestly. The American people are not fools. They want the best, and they will prefer the American article to the European, quality for quality.—*Textile Record*.

Geo. L. Fowler, editor of the American Railway Publishing Company's papers, the *American Journal of Railway Appliances*, *Street Railway Journal and Power*, has been appointed first-assistant commissioner to the International Railway Exposition to be held in Paris during the coming summer. His address is 113 Liberty street, New York.

By a recent German invention, files are made on the built-up plan. The file complete consists of a series of grooved plates held on a bar with a handle at one end. When the file gets dull there are means for tilting the leaves, presenting a flat surface which may be ground on a grindstone or emery wheel.

Baldwin Locomotive Shop Notes.

Last year when the dull times caused many complaints, the Baldwin Locomotive Works built 550 locomotives. This year 2,700 hands are employed in these works, turning out every week 13 new locomotives of all sizes, besides a large amount of repair work. From these figures it will be seen that the number of men employed per engine is small, but by going through this establishment and noticing the system of doing work, also the machines used for the purpose, the secret of the success for which the Baldwin Locomotive Works is noted must be apparent. When a few days ago we visited these works, we were impressed with the effort made to obtain perfect workmanship, which is, with the aid of templets, absolutely necessary to make the different parts of a locomotive interchangeable. Again, in order to build a locomotive perfectly and quickly and at low cost, many special machines for making the different parts of a locomotive have been designed and are used. Thus, for instance, four locomotive frames are slotted at one time in a machine admirably adapted for doing this class of work. A great amount of wrought iron work is made in dies; channel iron for tender frames, and angle iron for tanks are quickly and accurately bent to the required shape by machinery. The wrought iron cylinder casings are made, and the flanges of a circular flue sheet are turned in a hydraulic press. Labor is saved, and greater accuracy is obtained by machines designed for punching the holes in boiler and tank sheets. When such sheets are to be punched by these machines, the holes in the former are not laid out by the so-called regulators or templets, but the sheet is fastened in a correct position to the machine, which being set to the required pitch of rivets, will punch the holes, one at a time, at correct distances apart. To punch a row of holes occupies comparatively a short time, and the cost of punching the holes in a sheet is small, since only one man is required for operating the machine. Angle irons for tanks are punched in a similar manner. One of the results obtained by the use of these machines is, that when the plates of a boiler or tank are to be put together all the holes in the plates will come in line, and greater accuracy will be obtained than when the holes in the sheets have been laid out by hand.

In regard to the accuracy of the workmanship we will mention one instance only. In passing through the different departments with the superintendent, S. M. Vauclain, we noticed a workman fastening a strap to a connecting rod, each being planed or slotted and drilled in separate machines, and by different men, but made to templets. The result was that that strap fitted the rod accurately, and when the workman was ordered to place the same strap on another rod which happened to lie alongside, it was found that this strap fitted the second rod equally well, and the holes also being exactly in line the strap was readily fastened in a correct position to the rod.

The foundry sends out daily about 90,000 pounds of castings. Of course this includes castings used for repair work. On an average six cylinders are cast every day, and in order to bore these cylinders in time for the erecting shop four cylinder boring machines are used.

W. H. Morrow, manager of the works, informed us that a number of master mechanics preferred wrought iron crank-pins, although the majority of crank-pins are still made of steel. Mr. Morrow's opinion is that a wrought iron crank-pin made of good material and case-hardened to an equal depth all around, and then trued up and highly polished, will give good satisfaction; and if the workmanship of an iron crank-pin is poor, these pins will give trouble.

He also informs us that more cast-iron slides are used at present than formerly, from which excellent results are obtained. He mentioned a locomotive built years ago by Mr. Baldwin, which had run in Cuba for twenty-five years before new cast-iron slides were called for.

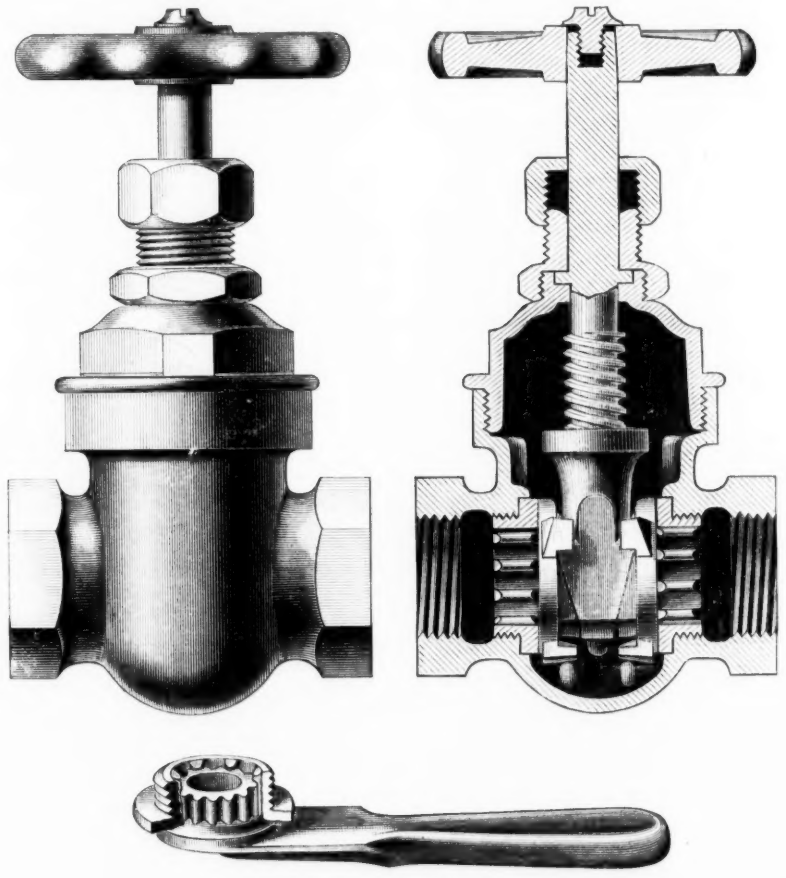
Steel seems to be the favorite material for axles; and steel, cold-rolled iron and cold-rolled steel are used for piston rods.

Butt joints for longitudinal seams are looked upon with favor at the Baldwin Locomotive Works. It is claimed that these joints are stronger than the lap joints. When butt joints are adopted, the expense of building the boiler will be increased by about $50. Lap joints are used for all circular seams.

Blessing's Straightway Valve, With Reversible Seat and Gate.

The advantages of having both the seat and valve of globe valves removable for repairs or renewal, without disturbing any of the pipe connections, have led the Albany Steam Trap Co., Albany, N. Y., to bring out straightway valves in different sizes, having the same convenient feature.

The seats of these valves, which are annular rings, are threaded on their outside to screw into the body of the valve from the inside. On the interior of these rings, as seen in small engraving, there are projections not unlike the teeth of an internal gear. The small wrench shown fits over these projections in a manner clearly illustrated. After removing the cap, this wrench can be inserted, the seats removed, and new ones substituted, or the old ones repaired and put back. The gates, of course, come out with the stem and cap.



STRAIGHTWAY VALVE.

The nut is free to move in or out, and forms the wedge for forcing the gates outwardly against the seats. The stem having no motion but that of revolution, the packing is preserved; the collar on the stem also prevents the escape of water or steam to the packing.

In closing the valve, there is no dragging of gates across the seats. The first operation is to carry the gates to a position opposite their seats, then further revolution of the stems wedges them out. In opening the wedge is first freed, then further motion opens the gate.

These valves are so constructed that they are equally applicable to steam or water. The bodies are of best steam metal, and the removable gates and seats are of phosphor-bronze.

The Kaukauna *Sun*, of Kaukauna, Wis., issues an illustrated edition to explain the inducements to locate manufactories in that town. Kaukauna is on the Fox River, which is navigable. The *Sun* says:

The government canal, the creation of which was commenced in 1855, for navigation purposes, is 4,000 feet in length, and furnishes a power paralleled by but few. It is controlled by the G. B. & M. C. Company, the Hon. A. L. Smith, of Appleton, being secretary. Several mills and factories are located thereon, and like others who have wisely selected this city for the prosecution of manufacturing pursuits, enjoy an unfailing power, having an average head ranging from 16 to 24 feet.

We suggest as a desirable piece of information for parties looking for manufacturing sites that the *Sun* explain how a private corporation comes to control a government canal.

A New York Foundry.

Some idea of the extent to which cast iron enters into the construction of pianos may be had by a stroll through the works of T. Shriver & Co., on East Fifty-Sixth street, New York. Although making piano frames is only a part of the foundry business of this firm, this part alone makes a large business. These frames are especially ugly castings to make; they are irregular in shape, being for the greater part of their surface thin, but having comparatively heavy projecting parts that tend to twist the thinner parts out of shape. When a new pattern comes in to be made, judgment gained by previous experience helps in determining the best course to pursue; further experience must settle the rest. These castings must be smooth, and good and well known brands of iron must be used. The sand for this work must also be of a good quality.

The frames must be drilled—there are almost innumerable small holes in them—which is done in a shop connected with the works. The drilling machines, of which a large number is required, were devised for this special work. They are a species of "sensitive" overhead drill, with a table mounted on rollers. The spindle is fed down by foot power, a rope running over an overhead sheave, and terminating in a loop near the floor, so that the operator can change his position readily; the spindle is returned by a spring. The pressure of feeding comes directly to top of the spindle, and in line with its axis. The driving pulley runs on a projection of the upper box casting, and revolves the spindle by a spline; this practically eliminates lateral strain of spindle in the boxes, which is necessary to preserve the requisite sensitiveness of spindle for rapidly drilling small holes. Flat drills are used, running at high velocity; the light castings we are told, are liable to spring sufficiently to make the use of twist drills impracticable. Some of the drilling machines are arranged to be swivelled to drill at an angle by merely manipulating a lever.

The japanning of these castings is also done at the works. In many cases, for the best frames, four coats of japan, carefully rubbed down between the coats, are required.

In the foundry there are 24 travelling hoists, of a pattern specially designed for the purpose. The hoisting is on the differential gear system. These hoists being comparatively light are quickly moved on the overhead tracks. They cover the main part of the foundry floor. Hoisting off, turning over and closing the large surface flasks required for making piano frames, and similar castings is done by the aid of these hoists very expeditiously, and without the exercise of much mechanical skill. These hoists adapt a large floor space to be used to excellent advantage in regularly making any particular kind of castings; in fact the foundry is more particularly adapted to the making of castings for manufacturers who require a constant supply.

Hydraulic hoists are used in the works, consisting of a straight plunger of sufficient size, with a platform on the top. One of these hoists the iron from the yard to the cupola staging.

Part of the yard room of the foundry is already under cover of skylights, and the rest is being put under cover. When this is completed all loading and unloading of material will be without exposure to the weather. We noticed that cast-iron frames are being made for the skylights. Cast iron cross-bars have been put in the wooden frames for the foundry, and we are told that they hold the putty much better than wood; in fact, that the putty never lets go of the iron, while in such exposed position it would hold the wood only about one year.

Copying presses are quite extensively made at these works. The square double threaded screws—about ½ inch pitch—are cut on centers, with dies, at once running over, leaving a nice thread.

One of the curious items of manufacturing news is that the New England Scotch Cap Company, of Bridgeport, Conn., will remove its factory to Milwaukee, Wis. The sons of old Scotia seem to follow the star of empire, as soon as they discover its course, and typical Scotch industries must move with them.

Springfield, Ohio, claims (without dispute) to be the principal city manufacturing agricultural implements. It is gratifying to hear that they expect for 1887 the largest year's business they have ever had, and are preparing to meet it.

Queen Victoria has ordered a set of Burmese glassware from a glass company in New Bedford, Mass. Perhaps now the Anglomaniacs will discover that American ornamental glassware is just the thing to buy.

A Buffalo machinist, in renewing his subscription to the AMERICAN MACHINIST, writes us: "When I first subscribed for your excellent paper, I was serving my apprenticeship, and was not receiving enough per week to pay my subscription. Now I am getting nearly enough per day, which result is in no small measure due to the AMERICAN MACHINIST."

The use of cheap artificial gas for some manufacturing purposes is making considerable progress. It is said in laundries, for heating the rollers of ironing machines and for heating hand-irons, it effects a saving of one-half as compared with the more expensive illuminating gas. There is yet one serious objection to this gas—it is odorless, and may escape in a room so as to cause death without giving any intimation of its presence.

The free reading room and library of Cooper Union in this city, will be re-opened about February 1, after undergoing extensive alterations and improvements, costing about $300,000. More than 2,000 persons a day visit the reading room and participate in the benefits of that grand institution.

Moulding Pulleys.

By Robert E. Masters.

We illustrate in this issue a few of the plans employed in making split pulleys of ordinary and medium weight, the demand for which has become quite extensive. The dotted lines in all the drawings show the position of the cores when ready to cast.

Figs. 1 and 3 are side and plan views of the hub and lugs in which the bearing after being split is at the outside of the lugs *A A*. Fig. 2 is section view of the core-box for same. The wings *B B* are made on one part of the center core with holes in the end of the box to draw vent wires through for vents *C C*. This makes a safer and stronger core for parting the lugs than where half of each side of the lug core is made on each half of the center core. The core-box must be made so that when that portion of the center core which has the lug cores attached has been made the other part of the center core, which goes to make up the circle at *D* can be struck off in the same box at *E E*, and when pasted on the lug cores, will be in the center.

Figs. 4 and 5 are views in which the side cores cut through the lugs at *F F*, leaving the bearing at the center. In Figs. 6 and 7 the lug cores are separate from the center core as in Fig. 5, but they do not cut through the outside of the lugs, thereby giving a bearing at *G G*. Fig. 8 is a compromise between these plans having a bearing at the outside of the lugs at *H H*, and at the top and bottom of the hub at *I I*. The core-box, Fig. 2, will do for this plan of splitting the hub by putting in pieces of wood to form the openings between the lug and center core at *I I*. In the methods shown the lugs are loose and part at the joint of the arms, and can be fitted to an ordinary hub pattern, and although the pulleys when cast do not present a very attractive appearance, they are some of the quickest plans that can be employed in job shops. Fig. 9 is the lug on the rim of a pulley moulded from a pattern in halves. The upper part of the lug lifts off with the upper half of the pulley pattern and the core which divides the lugs extends into the rim of the pulley. It is best to have the core in two pieces, fastening one in the cope and the other in the drag. This prevents the sand from being "crushed off" and falling down into the rim which is liable to occur if the core is in one piece and closed on over it Fig. 10 repesents the lugs on a wide face pulley made from a band pattern. Fig. 11 is a plan view of a lug the whole depth of the rim. Of course, in any of these plans the pulleys are bored and turned before splitting. Some time ago we cast two split pulleys 14 feet diameter, 33″ face. The pulley was cast in halves in green sand, the weight of each half being 10,500 pounds. The side of the hubs and lugs at rim were faced off and the two halves moulded together before finishing. The only objection to casting each half of a large pulley at separate heats is the difference that might occur in shrinkage. Care must be taken to make the mixtures (as near as possible) alike.

The American Machinist of November 20, 1886, contains on the first page an illustration of a large pulley on a Corliss engine manufactured by the Fishkill Landing Machine Company.

The reader will notice by referring to that issue that it is really a double arm pulley doing double duty. I wrote to the above company for the details of making that particular pulley mentioning that I wished to add it to this article.

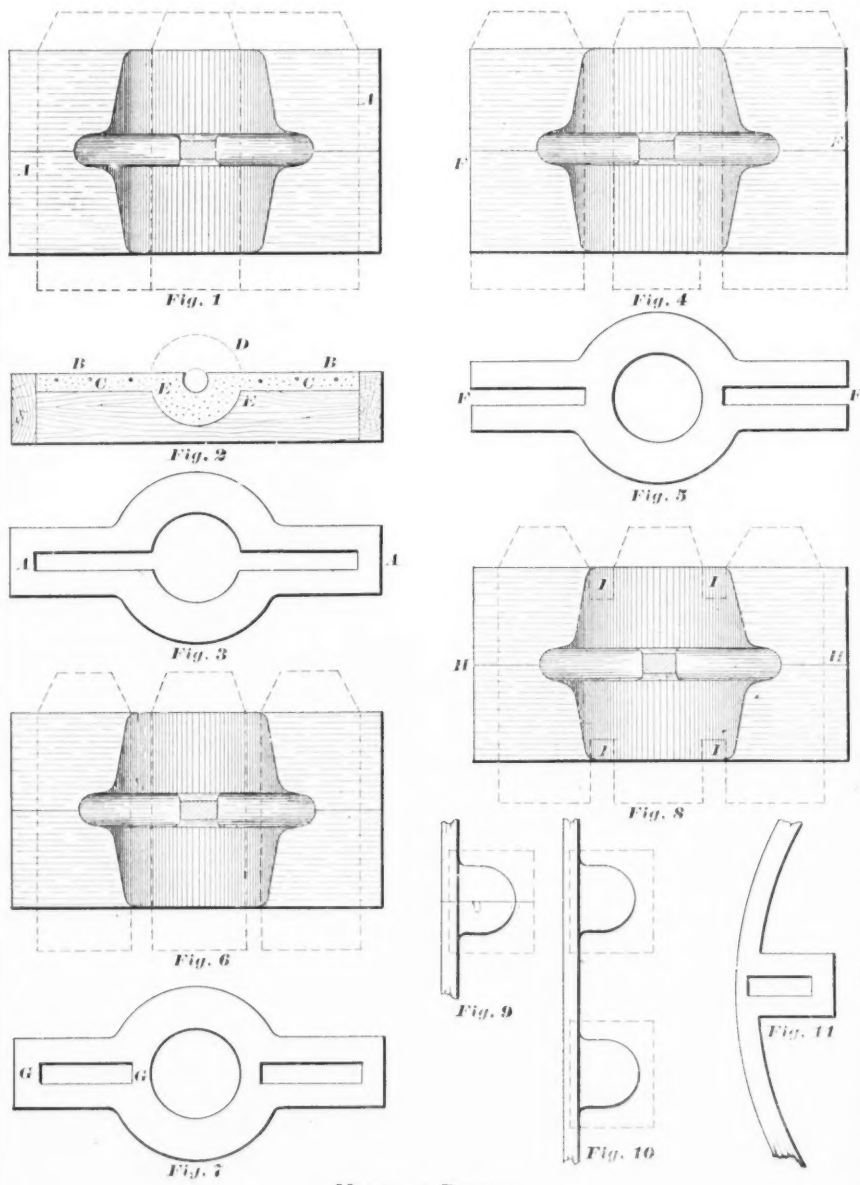
Mr. Robert J. Halgin, President of the company, very kindly responded that he was glad to give the readers of this journal any information he could, and I take pleasure in presenting it *verbatim* from Mr. Halgin's letter:

"The pulley named was 18 feet diameter, 6 feet 8 inches face, or each part 3 feet 4 inches, each hub 24 inches diameter, 27 inches long, and bored 14 inches. The weight of the entire pulley as shown is 58,000 pounds. It was cast in green sand, except the top side of the arms which were dry sand cores. We cast one piece at one time for convenience in the cast, though we often cast the two pieces at one time, but we always plane the joints and bolt the parts together before they are bored or turned. We make pulleys in this form for two reasons: one that our customers have been pleased with the two sets of arms, and think the pulley more stiff than with the single set, and the other that we have less strainage on the narrow rim than with wide one for green sand work."

Machine Tools for Patternmakers.

By F. W. Barrows.

Another very useful tool in a pattern shop is a good band-saw. The more it is used the better it is liked, and one is continually being surprised by its capabilities. It will do nearly everything that a circular saw can do, and a great many things that can't be done by a



Moulding Pulleys.

circular saw. The band-saw, if kept in good order will do nice work, but if the guides are allowed to get worn out of shape, leaving the edge of saw loose, the saw so badly set and filed that each and every tooth strikes in in a new place on the stuff being sawed, and then the hole through the table so large that you can stick your finger down through the table all around the saw, it won't be likely to do very nice work, and it wouldn't be safe to get very close to the line in sawing, because you never would be sure of where the saw was cutting on the bottom side of the stuff. With a saw that is set and filed accurately, you may safely cut right up to the line, when necessary, if you don't crowd the saw, but allow it time to cut free and clean.

In sawing short curves it is very easy to cramp the saw by feeding too fast, or in the wrong direction. It is hard to give any explicit directions in regard to feeding when sawing curves, but let the feeding be so done that all the power exerted will tend to force the saw against the collar or plate behind it. You shouldn't twist the stuff so that the saw is presed hard against the sides of the guide, as this causes great friction and consequently throws a great strain on the saw, also heating it. If you persist in doing this you will break a great many saws, besides wearing out the guides very fast. The rubber covering on the wheels will also come in for an excessive amount of wear.

When the saw needs setting or filing, before you take it off the wheels brush the dirt and gum out of the teeth. A file card does this first-rate; then joint the saw with an emery stone, taking care to hold the stone square across the saw. Take off the saw and if it needs setting, set it just as little as possible. Don't try to make a wide saw do the work for which you should use a narrow saw by setting it very wide, for it won't work nice, and it is hard on the wheel covering. In filing, it is customary to file all from one side and square across, although the saw would cut better if filed partly from each side.

After the saw is replaced on the wheels, and the guides adjusted to the saw, not the saw made to run in the guides, just as they are, because it runs so before filing, unless both the top and bottom guides are just right to fit and hold the saw. Make sure that they are just right. They should be exactly in line with the saw, and take in the whole width of saw except the teeth. Then adjust the upper wheel. This will usually have to be done whenever the saw is changed, and sometimes when a saw has been newly set. The wheel is usually, and I presume always provided with means for tilting it over toward the front or back as may be necessary, so that the saw won't run off. It should run against the back of the guide very lightly when not doing any work. This saves the guides and also prevents any unnecessary heating of the saw.

Now joint off both sides of the saw in this way, use an emery stone having a flat surface, then holding the stone against the side of saw touching the back edge, first keeping it in contact with the back edge swing it around until it touches the sides of the teeth. This method will prevent any possibility of cutting off the front corners of teeth, and therefore the saw will cut to its full width.

The saw should run straight and true when in motion and not squirm around like a snake, as I have seen some do. You can perhaps imagine how close to the line it would be advisable to get with a saw that runs back and forth sideways, three or four times in each revolution. Of course this sidewise motion should be controlled by the guides but the same saw that has the most need of the controlling influence of the guides doesn't get it because the guides are in no better shape than the saw itself.

A saw that has been broken and mended a number of times is very apt to run crooked not only on account of the joints, but because the soft places which the brazing of the joints make, are very apt to get bent. When your saw gets broken and you wish to mend it, begin by filing down the ends you wish to join. Make the joint from ½″ to 1″ long, taking care to file the ends to a straight taper, so that the joint will fit closely together without springing and also be of the same thickness as the rest of the saw. This is important as you will find that if you have to spring the joint together when you braze it, you will spring the saw on each side of the joint. Then when you are ready to braze the joint, take care to clamp it down straight, and don't get more thickness of brass, silver or whatever solder you use than there will be of steel after the joint is finished Put the saw on the machine, adjust the guides and try it. If the edge runs in a straight line, and the new joint passes the guide without being heard, you have done a good job, and you will be repaid for all your troubles by the quality of work turned off.

If I should try to tell all that might be done by a band-saw I should wear out the patience of the reader, and perhaps not tell him anything new after all. The best job I ever heard of as being accomplished on a band-saw was the sawing of gear teeth, right to the line, so that they only required sand papering to complete them. I didn't see the gear teeth, but I always thought they must have been finished before the sandpaper touched them. Seriously, about the only thing in the line of sawing that can't be done on a band-saw is making holes. This is where the band-saw has to yield to the jig-saw, its older relative. This machine (the jig-saw) as in use in most shops, makes more noise than all the rest of the machinery together, and does comparatively little work. It is just the opposite with the band-saw, which makes very little noise, but does a great deal of work.

There are, of course, some exceptions to the kind of jig-saw noted, but even the best of them require constant care and a good deal of it. The saw wants filing very often, and why shouldn't it when you remember that about 5″ in length of it does all the work, and consequently gets dull very quickly? Then the guides for the crossheads—perhaps there are two crossheads—must be kept snug, and the connecting rod or pitman mustn't be allowed to get loose, and there is usually trouble in keeping the machine oiled, as the sawdust, more or less of it (generally more) falls directly on the crosshead and pitman, and soon absorbs the oil from these parts and from the guides. But we must put up with them with all their faults, because we can't saw holes with a band-saw, until some genius (?) makes a band-saw with a joint in it.

One great difficulty in the way of a smooth running jig-saw is a little too much speed; they run too fast. If the pitman and crosshead are very heavy, and are not well balanced, you can easily see what a little too much speed will do. Then there are jig-saws that are not provided with any appliance to ease the shock of reversing the motion at the end of stroke. The spring commonly used at the top to strain the saw helps the reversing at the lower end of stroke, but hinders it at the upper end. Another point where the jig-saw has the advantage of band-saw is in the size of work which may be done. On the band-saw the size is limited to the diameter of the wheels which carry the saw, but with the jig-saw the only limit to size of stuff

sawed is the size of the room where the saw is located.

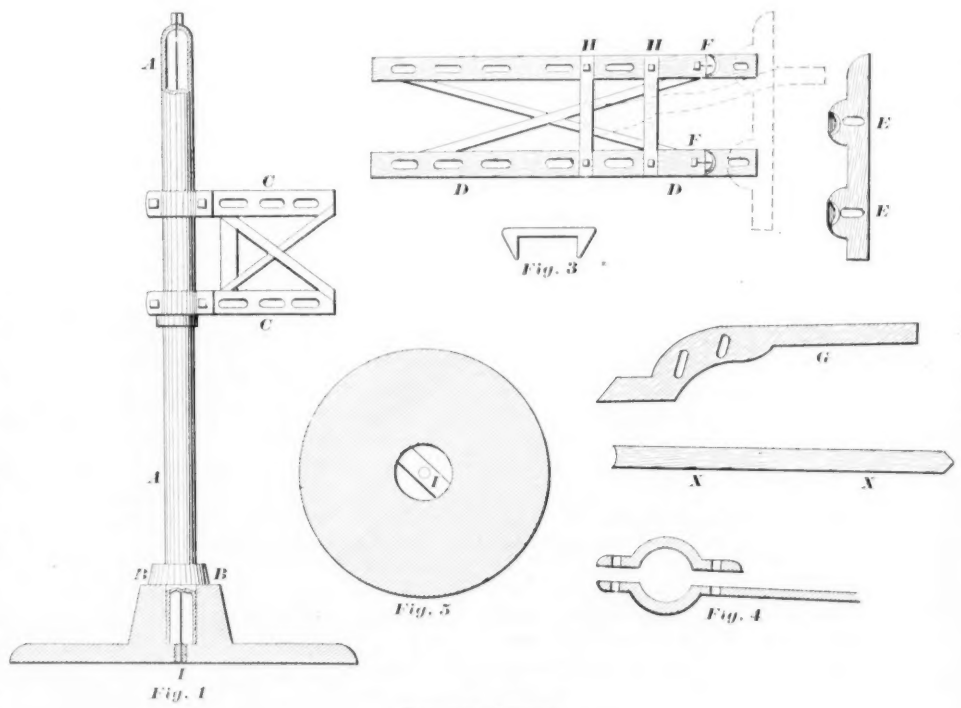
A good jig-saw should have its crosshead and pitman as light as is consistent with the necessary strength, and well balanced, with a good tension for saw at the top end. This is a sure method of holding the saw, and one that can be operated quickly. The pitman must not be too short; neither should it be too long, as this will add unnecessary weight to the reciprocating parts. Not less than three, or more than five times the length of stroke will put the length within reasonable limits. The tension spring helps the reversing at lower end of stroke. Then if the blower for removing the sawdust could be located at the top end of stroke; but the difficulty in the way of this is the pipe necessary to convey the compressed air from the blower to the upper surface of work. Still an air cushion might be utilized to keep the sawdust off the crosshead and guides, and it would certainly make the saw run steadier. Then, to bring out the good points, and make them show to the best advantage, the saw should stand on a good foundation.

It is not a good plan to use much oil on the saw, or the saw guides, because the sawdust sticks to it, and the oil gets on your work, and it makes things dirty and disagreeable. This applies equally well to the band-saw. It is much better to keep the saw in such good order that it will need no oiling at these.

I recollect reading in the AMERICAN MACHINIST about the influence which poor tools, dirty machines, and the poor work resulting therefrom, had upon the character of the workman. Where these things are chronic, the man's work will soon become, like the shop, poor and dirty in looks, and whoever saw a dirty machine do a good job?

Take, for example, a band-saw that hasn't had the oil and dirt wiped off in six months, and this too, where it has been the rule to oil the saw and saw guide as often as sanyone thought necessary. The oil will collect all the sawdust that will stick to it; the more oil, the more sawdust. The saw itself I should expect to find in keeping with the machine, every tooth set to a different width, and filed to a length of its own. This saw won't do good work, and the man who has the care of it won't be apt to lose much sleep on this account.

Iron has advanced in price, and machinery which has been selling low must advance all along the line. All signs indicate higher prices.



FOUNDRY SWEEPS.

LETTERS FROM PRACTICAL MEN.

Foundry Sweeps.

Editor American Machinist:

Sweeps are a thing in which every foundryman is more or less interested, and in my experience I have seen a great many sweeps, good, bad, and indifferent, and to this list I will beg leave to show another one, and leave the readers of the AMERICAN MACHINIST decide as to which of the above classes it belongs. In my own practice the sweep shown is the best one I ever used, and it has some good points in its favor. The main post *A A*, Fig. 1, is made of cast iron, with $1\frac{1}{4}$" hole through it and the post is finished to $2\frac{1}{4}$". A shoulder is cast on the post *B B*, where it rests on the base plate. The base plate is bored to suit the post. Across the bottom of the hole a piece of bar iron *I* is fastened having in the center a $\frac{5}{8}$ tapped hole. The post *A* when placed into the base plate is firmly secured to the same by passing a bolt through the center of post and screwing it into the piece *I*. The wings of the sweep are in two parts, the part *C C*, Fig. 1, and of which a sectional view is given at Fig. 4, is cast with one-half of a box to it. The caps are separate; the box is babbitted and bored to fit the post. The boxes can be tightened or loosened to suit. The frames *C C* and *D D*, Fig. 2, are made to slide in each other. In using the sweep the frame *D D* is placed in *C C*, and can be moved out or in as required. The holes in the frames are for bolts to fasten the frames when set. If I was going to make a 10' wheel, I would sweep up the outside in the following manner: I would set the frame *D D* so as to make a circle 9' 11" in diameter. At *E E* is seen a blade with two oblong holes in it, and two lugs on it; this blade is attached to *D D* as indicated by the dotted lines, set screws pass through the legs on *D D* and press against the lugs on *E E*. The set screws *F F* press the blade out as far as desired; the blade can be moved $\frac{1}{8}$" or $\frac{1}{4}$" at a time or less by this way a true outside can be obtained.

In case a mould is to be swept a certain depth, and at the same time have a true parting, you then attach the blade *G* to *D D* as indicated by the dotted lines. This blade is fastened on *D D* at *H H* by means of bolts, and can be raised or lowered; the oblong holes allowing this to be done. *X X* represents a gauge, this gauge is cut $1\frac{1}{8}$" shorter than $\frac{1}{2}$ the diameter of the mould to be swept up the concave end is placed against the post, and the other end will tell when the right diameter is obtained. These gauges are made of wood, and different strips can be made for different jobs. They can be marked and laid away for future use. In case a mould is to be swept slanting, you just move the upper or lower set-screw in the blade out any distance you require.

In case you desire to sweep up a small circle you remove the frame *D D*, and simply use the frame *C C*.

A sweep that has a tapering end on the post often becomes loose in the base plate, and consequently the mould will not be true; but in this sweep the post is held securely to its position by the rod passing through the post and being screwed into the bar beneath the base plate.

Fig. 5 represents the base plate showing the under side. F. B. SHAFFER.

Lancaster, Pa.

Bad Pranks in a Foundry.

Editor American Machinist:

I read a good deal in the AMERICAN MACHINIST on foundry practice from our friend Robert E. Masters. There is another kind of foundry operation that is often practiced—and frequently hard to detect—and that is moulders playing tricks on each other. It is a great source of annoyance to the employers, and woe to the man who gets the ill will of his fellow workmen in a foundry. They are very apt to put up a job on him by spoiling his moulds; such as putting sand in the gates, or pushing down a gagger or two, and it seems almost impossible to find out who does it, as every one is sure to deny it. The writer knows a man who was brought here to take charge of a foundry. He was a good man—a man of large experience on heavy work, and was anxious to do the best he could for the firm; but somehow the moulders did not take kindly to him. They commenced to do him up by playing tricks upon him, and caused him to loose several heavy castings. This was the means of bringing him into disrepute with the employers. Finally he had to leave the position in disgust. In the foundry of the writer we do considerable snap or bench moulding. Such work is generally done by boys, and they often work by the piece. A good ambitious boy likes to get up all the moulds he can. Such a boy is likely to get the ill-will of his more lazy shopmates, and is apt to have a good many of his moulds spoiled.

One of our boys was annoyed very much by having such tricks played on him, and it seemed almost impossible to find out who did it. The plan that was taken to spoil the mould was to drop a handful of sand in the gate, then push it down with the finger, then the mould was apparently as good as ever. When the iron was poured in it went no further than the depth of the finger. The result was, when the moulds were shaken out, that there were a lot of cast iron fingers, a thing we did not need. How to catch the rogue was the next question. Well we gathered up about half a dozen of the iron fingers and cleaned them with acid, as the sand was very fine. It showed every wrinkle in the skin of the original pattern, and the exact size and length of the fingers. We then called all the boys up and placed them in a row, and made them hold out their right hands, a thing they were all willing to do with but one exception. We compared the cast-iron fingers with each one, until we came to the culprit who stoutly denied it. We told him it was no use to deny it any longer, the case was too plain, and you may rest assured we were not long in hustling him out of the foundry. We gave him one of the iron fingers and told him to give it to his father, and tell him why he was discharged. Such a boy will never do any good wherever he goes. We learn that he eventually drifted into the penitentiary. We were not troubled any more with cast iron fingers. BENJ. F. HETHERINGTON.

Indianapolis, Ind.

Mr. Lowe Replies to Criticism on Tubular Boilers.

Editor American Machinist:

I notice in No. 51, a letter from W. C. Crane, referring to my papers on horizontal tubular boilers in Nos. 48, 49 and 51, which seems to require an answer. Had Mr. C. observed, and been cautioned by the references to superficial observation and tests, and under what duty boilers primed most, there would probably have been no need of this communication, because all the points of consequence in his letter would have been seen and answered by deeper investigation of my papers. The surprise of parties using this or any other type of boiler comes in when the engineer is trying to make the boilers do their fair rating, but cannot do it, because of wet steam; this is the time when the water should be carried well up in the boiler to pack the heating surfaces so that the work can be done, but this remedy is worse than the disease in a domeless boiler, and more water goes over with the steam, and there is no sure cure but the dome; and if Mr. C. will reread my papers, he will see that my principal claim for the dome is for this very kind of a case, and not so much on account of the storage of steam or power, and that the dome prevents break downs of engines and annoyances from wet steam, and is a guard against the supposed ignorance of the fireman or engineer, in carrying water too high, which Mr. C. refers to.

I agree with Mr. C. in regard to faulty piping, causing condensation and trapping of water, and periodical injecting it over into the engine, as I have seen much of this fault. As to the weakness of the dome boiler at the dome, I have been making dome boilers for 32 years, and never had an accident, and do not remember a bursting or exploding of a boiler, wherein it could be shown that the fracture started at the dome, in any well made boiler. On the other hand, I have seen exploded boilers with the dome intact and the shell of boiler all to pieces. An accident to the boiler may not be as bad as a break down of an engine, but an explosion of a boiler, we all know, is likely to be more disastrous.

Finally, in regard to the test offered as evidence that the domeless boiler is all right, and covers all requirements, I have to say, that a full investigation of it will disclose the fact, that it was not such a test as would show what the boilers would do under reasonable duty of the heating surfaces, and that the conditions in the massing of the heating surface in 6 feet boilers, low rate of evaporation per foot of heating surface, requiring 19 feet to evaporate one horse-power of water (30 lbs.) per hour, and the low rate of combustion of the fuel, and temperature of the gases leaving the boiler, and draft of steam from the boilers, all show the best conditions for economy of fuel and quality of steam. As to the result of evaporation per pound of coal claimed, it is so much above the result of tests of any boiler I know, wherein all the wood and coal was weighed and all accounted for absolutely, that I must leave it to the consideration of those interested to determine for themselves, whether it was possible for good judges to judge (I might say guess) near enough to 6,800 pounds of coal and combustible remaining upon the grates at the termination of a ten hours' test, to warrant the statement, that the result was sufficiently accurate to be used as a guide, and a warrant to the users of this type of boiler, that they would do as well under these, and pro rata, under increase of duty up to 10 feet of heating surface per horse-power, not an unreasonable expectation from a dome boiler, and with this duty and draft of steam from these boilers, what would the quality of steam be? Some idea may be obtained by investigating the test of the cylinder boilers with which the test in question was compared, and which shows, that $4\frac{1}{2}$ feet of heating surface evaporated one horse-power per hour, 30 pounds of water per hour against 19 feet in the tubular boiler, and what the quality of the steam was. I might continue and give much data, to sustain my statements on boilers and tests, and will say that it is customary to make tests of boilers in the way the one in question was made, and they are considered sufficiently accurate, generally, to answer the purpose intended, but accuracy in such tests, of the magnitude of this one, can only be obtained by long trials of a week or weeks duration, great expectations should not be based upon doubtful conditions.

WM. LOWE.

Borings or Turnings.

Editor American Machinist:

In your answer, 420, Dec. 4, 1886, in relation to rust joints, you say: "It should be cast-iron borings, or cast-iron turnings may be sifted." I sent you a few days ago,

a package of cast-iron borings, inscribed in cover "borings, or turnings, which?" I am thinking they would need "sifting" far more than the average turnings to be made useful in rust joint work. They are a random lot, quite likely a little coarser than the average from a 6″ or 5½″ diameter hole. The feed was from the face plate, the tool holder projecting through a 3½″ hole to get at business.

I have seen similar borings from holes one inch or less in diameter. I have known an apprentice to bore 28 couplings for a 2 inch shaft and face the end of the hub in five hours, using a similar boring arrangement. The couplings were the common flange, or face coupling. I recently saw a first class man operating on some of the same kind, but for 2¼″ shafts, and found by observation that he was one hour boring each piece.

The apprentice did his work on an engine lathe with compound rest, the "jour" did his on a chucking lathe.

What have you to say for the borings?

Tyngsboro, Mass. A. M. Swain.

[We can say for the borings that they show excellent work of the tool. We may also say that if anyone did not understand from the answer referred to that the cast iron was to be in small particles it would be useless to try to tell him how to make rust joints.]

Testing Fuels for Steam Generation.

Editor American Machinist:

In the issue of the American Machinist of July 24, 1886, appears an item as follows: "Experts expend a good deal of unnecessary time in attempting to show that steam users do not know the most economical fuel to use. As a matter of fact steam users know a good deal more about this than experts do, and it may be depended upon that in any given locality they will be found using the fuel that costs the least money. What is wanted is to know how to make the most economical use of the available fuel in any particular locality. But this is something that figures alone will not show."

Also January 15, 1887: "A simple means for testing the value of different kinds of (fuel) coal would fill the proverbial long-felt want. It should be something that any man of ordinary intelligence can use and understand, and from which he can obtain results accurate enough for practical purposes."

Upon the appearance of item No. 1, I was very busy, but made a resolve at the time to favor you with a statement like the enclosed; first, to prove your assertion true; and second, to place before your readers a system it would be for their financial interest to adopt.

The record on the statement is made daily, then at the end of the month is copied into a bound volume of the same size sheets for preservation and reference.

This system was the outgrowth of a desire to know as accurately as possible what amount of evaporation we were obtaining from the coal used, so as to enable us to determine the value of the different kinds of coal offered us for use.

To obtain this information a Worthington water meter and a Schaeffer & Budenberg pyrometer were placed in the feed pipe leading to the boilers. With these two instruments we are able to ascertain the total quantity of water fed into the boilers, also the temperature of the feed water.

A car track is laid from in front of the boiler furnaces to the coal house. Between the furnaces and coal house and within the boiler room is located a two ton miners' scale. In passing to the coal house for a load of coal the coal car is weighed and the tare weight set down. The car is then loaded, run out and re-weighed. The net weight is then recorded and the total amount consumed for the day carried to the record sheet.

This system, in its present complete condition, has been in use here, only since May 1, 1886, but has proved to be of great benefit to the institution. The cost of water meter and pyrometer was about $100. To offset this cost we are saving 40 cents per ton on every ton of coal consumed for the generation of steam over what would have been the cost, had we continued to use the same kind and quality. The consumption of coal here is about 1,000 tons annually. The cost of coal formerly used per ton was $3.55; the cost of the coal now used is $3.15 per ton. The evaporative efficiency of the two is slightly in favor of the cheaper coal, showing that the price of coal does not govern its quality, although the former coal used had only 5.78 per cent. of ash by weight, while the latter has 11.98 per cent. of ash. The former kind is known in this market as the Coalton, Ohio, the latter as Sunday Creek, Ohio, coal, both coals being mined in the same county, I believe.

It is no extra trouble to make tests, as the meter registers continuously, without attention, and the variation in the pyrometer during a day's run is so small as not to require a noting of the temperature at frequent intervals.

By a reference to the statement submitted, you will see that four foot soft wood and soft coal burned together is cheaper for us to use than the same quality of coal burned alone, that is, 3,759 pounds of water can be evaporated for $1.00 worth of coal and wood burned together, while only 3,608 pounds of water is evaporated where the coal is burned alone. The fuel recorded includes that used for banking the fires.

From the foregoing it will be seen that we know exactly what the steam is costing us, also, that our system is practically accurate, and very simple to understand and manage.

To manufacturers and institutions who are paying more than $1.00 per thousand feet for gas, the gas record is also worth studying into.

E. Mansell,
Chief Engineer Michigan State Public School, Coldwater, Mich.

[The record sheet referred to in the foregoing is so large that we cannot conveniently reproduce it. It is very complete for each day in the month, with headings covering all observations required. The *Gas Record* is part of the same sheet. In the margin cost for each day is carried out, and at the bottom totals and average. Regarding the cost of gas made at the works we note that 19,029 feet cost for materials $12.28, which gives point to the closing paragraph of the communication.]

Employers Pleasant in the Shop.

Editor American Machinist:

I was much pleased to read in your issue of Dec. 18 an account of Mr. Horatio Allen's address at the meeting of the mechanical engineers, and think that those who, like myself, were unable to attend must have lost a rare treat. Mr. Allen's achievements as an engineer are tolerably well known among the profession; but it may not be as generally known that for kindness and consideration to his employes he has few equals. I noticed this more particularly, as, being myself a stranger from a foreign land, I could readily appreciate kindly sympathy from one in a superior position. When I was at the Novelty Works, some time in the fifties, I observed that everybody seemed pleased to see him around. In some shops I have heard words passed, the "old man" was coming, and the result was that everybody seemed to avoid any contact with him, for fear of ruffling his feathers, with the result of a disagreement, more or less serious; but there was none of that with Mr. Allen. At the time of the trial for the infringement of the Sickels' cut-off patent, when Mr. Dickinson, who, like a good many others of his profession, seemed to think that it was not necessary for a lawyer to be at the same time a gentleman, abused Mr. Allen in such a manner as to deserve a cowhiding; the feeling in the shop ran so high that I do not think it would have been safe for Dickinson to have put in his appearance there till a compromise was effected.

I hope the old gentleman may yet live as long as he desires, with the satisfaction of having filled an extremely useful as well as long lifetime.

I sometimes think, when I see an employer come around a shop, crusty and sour, how little he must have studied the economies of business.

If business cares and disappointments vex you, work them off somewhere else; for working them off in the shop is the poorest and most expensive way of doing it. The more you can encourage a man, and show your appreciation of his efforts, the more work you may reasonably expect from him, with fewer errors or mistakes. I do not say, Put up with poor work or laziness; but let the shop work stand on its own merits, and not let outside complications affect it.

The time has passed for regarding men as so many machines, to be hired for so much a day, and that the end of it. That shop will do the best work, and the most of it, where every man considers himself responsible for doing his part well, whether watched or not, and is so considered by those employing him; and mutual forbearance and good feeling will go a long way to mitigate labor troubles, and perhaps eventually settle the question.

Georgetown, Colo. Wm. J. Silver.

How Much Can We Afford to Give Away, and Still be Honest to Ourselves?

Editor American Machinist:

This is a question which may have various solutions, and those which may be directly opposite in their results, yet be deemed to be correct as viewed from different standpoints. I shall not attempt to answer the question as I think that is a thing each one should do for himself, and be guided in his decision by his own circumstances, which are, of course, best known to himself. To illustrate, I will give a few incidents from my own experience:

Not long since I visited the works of one of our best known builders of machine tools, and, being slightly acquainted with one of the department superintendents, I inquired for him at the office. I was at once conducted to his department of the works. He, being more than ordinarily busy at that hour, introduced me to superintendents of the other departments, and I was shown, to me, the most interesting operations and processes connected with their manufactures; many special tools and appliances were shown, and such as I did not readily understand were carefully explained. This treatment was entirely unexpected by me, and without precedent so far as I have had experience. Considering my very limited acquaintance, of course my estimate of their works, system and manufactures, was greatly enhanced thereby, and now having seen their strictly honest and systematic methods of doing work, should I have occasion to speak a good word for them I can honestly do so. So far as I am competent to judge I can safely say I know of one firm who build just exactly what they claim to build, and a visit like this would do more to convince me of the honesty of their work than a letter-press description couched in the most elegant language, and illustrated with a perfect work of art.

Some time since we had occasion to purchase a machine. The description, illustrated design and claims for the workmanship, were, with the maker's guaranty, absolutely faultless, and left nothing to be desired. After a careful trial of the machine, we found many points of inaccuracy, and after a considerable correspondence, one of the builders decided to come and be convinced of the truth of our statements about it. He did so, and consented to send us a machine which was all right in exchange. But to make a bad matter worse, the second was more imperfect, if possible, than the first; we have labored hard to improve it, and now have work in hand to correct its original faults in part. The design, however, still has its pleasing outline. Its builders worked their own destruction, I am told, and have gone out of business.

I was once doing some work on a locomotive link motion, and understanding at that time but little about it, I asked the foreman for some explanations about finding the radius of the link, positions of eccentrics and of stud on link saddle. He put on an owlishly wise look and would tell me nothing about it, although he claimed to have spent months of his life studying, and with a competent instructor, this very subject.

Did he think it would not be honest with himself to enlighten me on this subject?

Did he think he could not have a monopoly of that branch of the business in that shop?

What he thought I do not know, but I think he put on the wise look to cover up an ignorance which he was ashamed to admit, and would not tell me because he could not.

Of course some of us may have some tools, processes, or ideas, by the direct aid of which we are able to distance our competitors; these it would be downright dishonesty as well as the height of folly to make public.

But, on the other hand, we may have some simple attachment, some handy appliance, some common tool made in an improved way, or some new system of doing work, which the men in the shop where used must of necessity be conversant with. For these and many other things, if contributed to the American Machinist "Letters from Practical Men," we should be likely to get our return in new ideas, many times over, or to have our wrong ideas set right, which is nearly as great an advance as to get new ones.

If we help along these letters some employers will think: if a man can think and advance useful ideas for his present employer, and himself, he certainly can help me out, and a call from an unthought of quarter may, if nothing else, cause a rise in wages at your present place, and so it may turn out that we can not only be honest with ourselves, by giving away an idea now and then, but it will also prove an actual profit.

In the words of Josh Billings, "Secrets are a poor investment anyhow; if you tell them you lose them, and if you keep them, you lose the interest on the investment."

One of the Boys.

Latent Heat of Hot Steel.

Editor American Machinist:

I have read with great interest the article by John Coffin on the peculiar changes that occur in steel rails in cooling. The same peculiar action is noticeable in angles and other irregular shapes into which steel is rolled, though possibly not so marked as in the case of steel rails. But I feel called upon to differ with Mr. Coffin as to the cause of such action.

Instead of going so far into theory as to discover a new form of carbon in steel, or "a certain amount of chemical energy destroyed"—which latter is somewhat ambiguous—"which results in giving out heat," I believe the action is susceptible of explanation through the simple fact that hot steel contains a large store of latent heat.

In heating steel in comparatively large masses as ingots, blooms, or slabs, we have observed that the steel remains in the furnace a remarkable length of time without any apparent change, though of course during this time it is constantly absorbing large quantities of heat. But once a change begins to be perceptible the entire mass becomes heated through very quickly, and the heat is strikingly uniform throughout, so much so that the workmen often take it from the furnace to be rolled, without turning it over, as is absolutely necessary with iron to secure a uniform heat. These facts are more noticeable in steel, which has been once rolled or hammered, than in the cast ingot.

In the heating of iron, on the other hand, it begins to show the effects of heat immediately it is placed in the furnace. First, the angles or corners become hot and the heat can be seen gradually extending to the interior of the pile.

The top very frequently shows a bright welding heat, while the bottom remains cold and black, requiring to be turned over and exposed to the action of the flames before a uniform welding heat can be obtained. Very little latent heat there.

Another strong evidence of the existence of latent heat in hot steel is the fact that in the course of manipulation under the hammer, or in rolls, it shows an increase of temperature.

Very frequently a bar of steel is apparently hotter on leaving the rolls, after receiving a number of passes, than it was when taken

from the furnace. This fact can only be explained on the hypothesis of the contained latent heat becoming free or sensible, and to the same cause is in all probability due the strange action of steel rails, and other shapes of rolled steel in cooling.

Pittsburg, Pa. THEO. D. MORGAN.

Practical Drawing.

BY J. G. A. MEYER.

SIXTEENTH PAPER.

Problem 24.

157. TO DRAW AN ARC TANGENT TO A GIVEN STRAIGHT LINE AND A GIVEN CIRCLE, THE POINT OF TANGENCY IN THE CIRCUMFERENCE BEING GIVEN.

Fig. 120. Let $B\ C$ be the given circle, B the point of tangency in the circumference, and $D\ F$ the given straight line. It is required to draw an arc which shall be tangent to the given circle at the point B, and also tangent to the straight line $D\ F$.

Through the center A, and the point of tangency B, draw a straight line, and produce it towards the given line $D\ F$, as shown; through the point B draw the tangent $B\ F$ (see Art. 144), cutting the line $D\ F$ in the point F. Bisect the angle $B\ F\ E$, by the straight line $H\ F$ (see Art. 112), cutting the line $A\ H$ in the point H. From the point H as a center, and with a radius equal to $H\ B$, draw an arc $B\ G\ E$; this arc will be tangent to the given line $D\ F$, and also to the given circle $B\ C$, at the point B.

We have seen in Art. 153 that when two circles are tangent to each other, the centers of these circles and the point of contact must lie in the same straight line; therefore the center for the arc $B\ G\ E$ must lie some where in the line $A\ H$. Again, we see by Arts. 147 and 148, and plainly shown in Figs. 111 and 112, that the center for the arc $B\ G\ E$ must lie in the line which bisects the angle $B\ F\ E$; consequently the center of the required arc $B\ G\ E$ must be the point H at which the lines $A\ H$ and $H\ F$ intersect each other.

Directions.—In the space marked Prob. 24 draw any circle, as $C\ B$, shown in Fig. 120; also any straight line, as $D\ F$, outside of the circle. On the circumference of the circle mark off any point, as B, and then, by the method given in this article, draw an arc which will be tangent to the circle at the point B, and also tangent to the given line $D.\ F.$

Draftsman's Method.—In ordinary machine drawing, in which the radius of the arc is compar atively short, the draftsman will draw the line $A\ H$ through the point B and the center A, and then find the radius $H\ B$ by trial. But if the radius of the arc $B\ G\ E$ is very large, it will be best to follow the construction shown in Fig. 120.

158. The construction of this problem will fill the last space on the sheet.

Now, ink all the problems, clean the sheet, trim its edges, and lay it away for future reference.

Fasten to the drawing board another sheet of paper, draw the border lines, and divide the sheet into the same number and size of spaces as was done on the last sheet. Mark these spaces Prob. 25, Prob. 26, etc.

Problem 25.

159. TO DRAW AN ARC TANGENT TO TWO GIVEN CIRCLES, WHEN IN THE CIRCUMFERENCE OF ONE OF THE CIRCLES THE POINT OF TANGENCY IS GIVEN.

Fig. 121. Let $F\ G$ and $D\ H$ be the given circles, and the point D the given point of tangency in the circumference $D\ H$; it is required to draw an arc which shall be tangent to the given circle $F\ G$, and also tangent to the circle $D\ H$ at the point D.

Through the center C and the given point D draw a straight line $A\ E$ of indefinite length. From the point D as a center, and with a radius equal to the radius of the circle $F\ G$, describe a short arc cutting the line $A\ E$ in the point E. Through the center B and the point E draw a straight line $B\ E$, bisect the line $B\ E$ by a perpendicular $A\ I$, and cutting the line $A\ E$ at the point A. From the point A as a center, and with $A\ D$ as a radius, describe an arc $F\ D$; this arc will be tangent to the circle $D\ H$ at the point D, and it will also be tangent to the circle $G\ F$ at the point F.

160. When the given point of tangency is given in the circumference $G\ F$ instead of the circumference $D\ H$, the following method is adopted. Let $G\ F$ and $D\ H$ (Fig. 121) be

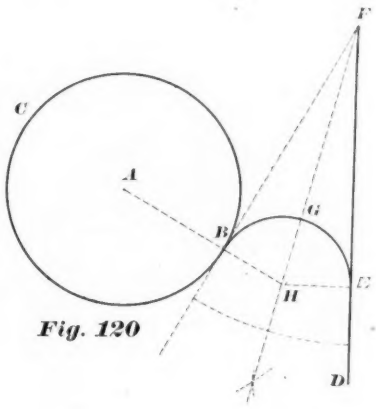


Fig. 120

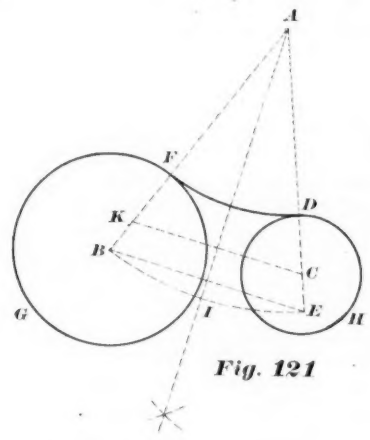


Fig. 121

the given circles, and the point F of the circumference $G\ F$, the given point on tangency; it is required to draw an arc which shall be tangent to the circle $D\ H$, and also tangent to the circle $F\ G$ at the given point F.

Through the center B and the given point F draw a straight line $B\ A$ of an indefinite length. From the point F as a center, and with a radius equal to the radius of the circle $D\ H$, draw a short arc cutting the line $A\ B$ in the point K; join the point K and the center C by a straight line $K\ C$; bisect the line $K\ C$ by a perpendicular $A\ I$ cutting $B\ A$ in the point A. From the point A as a center, and with $A\ F$ as a radius, draw the required arc.

In Art. 153 we have seen that when two circles are tangent to each other their centers and the point of contact must lie in the same straight line; therefore the line $E\ A$, drawn through the given point of contact D and the center C, will also contain the center A from which the arc $F\ B$ must be drawn, the center B, the point of contact F, and the center A must also lie in a straight line. But since $A\ F$ and $A\ D$ are radii of the same arc $F\ D$, it follows that the point A, at which the lines $A\ B$ and $A\ E$ cut each other, is the center for the required arc. By construction the lines $A\ B$ and $A\ E$ are equal in length, therefore the perpendicular which bisects the line $B\ E$ will intersect the line $A\ E$ or $A\ B$ in the same point A.

Directions.—In the space marked Prob. 25, draw any two circles, one larger than the other, on the circumference of either of these circles mark off a point; then, by the method here given, draw an arc which will be tangent at the given point in that circle and also tangent to the other circle.

Draftsman's Method.—When the radius of the required arc is comparatively short the draftsman will draw a line through the given point of tangency and the center of the same circle, and then find by trial on this line the center from which the required arc is to be drawn. If the radius of the required arc is very long, then it will be best to follow the method given in this article.

161. Our next step will be to take up the solutions of problems relating to polygons. The constructions of these simple polygons also offer an excellent opportunity of learning how to use a draftsman's scale, such as shown In Fig. 123 which is simply called a "scale." We shall therefore ask the student to work hereafter to the dimensions given in the figures.

There are mechanics who seem to think, that a scale is a mysterious tool, and its use very difficult to learn. But by a little reflection he will find that the scale is a very simple instrument and its use can be learned very quickly.

Fig. 126

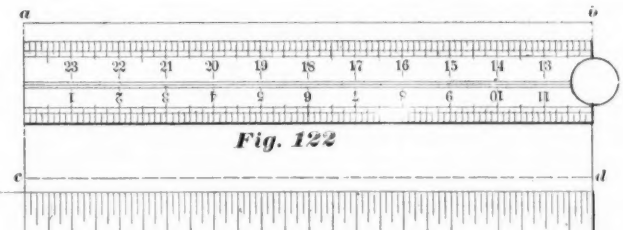


Fig. 122

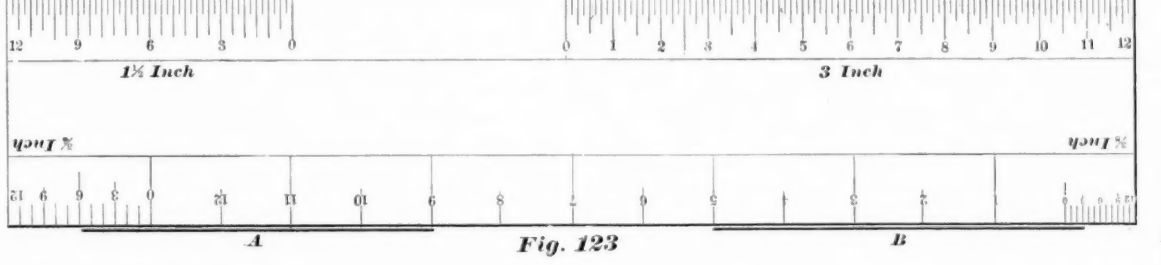


Fig. 123

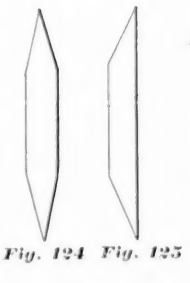


Fig. 124 Fig. 125

Fig. 122 represents an ordinary rule used by mechanics. But now assume that the ordinary rule instead of being one foot long when folded, its length is exactly the same as that shown in the figure, then such a rule would be of no use in the machine shop, because everything made by this rule would be too small. Yet a rule of this kind, which we might call a toy rule is very useful and convenient in a drawing room. In fact by comparing Fig. 122 and Fig. 123, we find that the only difference between the small rule shown in Fig. 122, and the scale shown in Fig. 123 exists in their outer form.

And from this we may also correctly infer that the manner of using this scale or our little rule is precisely the same as that of using the ordinary rule.

Now, it will be found that the length from a to b in Fig. 122 is 3 inches when measured with an ordinary rule. Here then we may say that 3 inches represent one foot. The distance from c to d on our scale in Fig. 123 also measures 3 inches, and represents one foot; and consequently if we use this scale in measuring a line on a drawing and find the length of the same to be equal to the distance from c to d on the scale, we say the line is one foot long. A scale divided off into divisions of this size is said to be a scale of 3 inches to the foot, or simply a 3 inch scale.

Again in drawing offices which are conducted in a systematical manner, sheets of some definite dimensions are adopted, and since draftsmen will always endeavor to fill a sheet, not by crowding on it as many details as possible, but by drawing on it one or two details only, and these as large as possible, it follows that a 3 inch scale will not always be suitable; sometimes he may make a full size drawing, and at other times he may have to make a drawing for which a $1\frac{1}{2}$ inch scale or a $\frac{3}{4}$ inch or some other scale may be needed, hence a draftsman will need several scales.

162. Boxwood scales are the favorite scales among draftsmen, and in the writer's opinion these scales are the best, and are preferable to rubber scales. Ivory or paper scales should not be used in a drawing office, as these scales are liable to contract or expand by an atmospheric change. Although we cannot recommend the use of a paper scale, yet if the student does not wish to incur the expense of a boxwood scale, he may make a paper scale as shown in Fig. 123 and use it in the constructions of the following problems; but never use a paper scale for making important working drawings.

In the writer's opinion each scale should be on a separate piece of boxwood, as these are the most convenient to use. But since these cannot be readily obtained in stores, it will be necessary to explain the scale shown in Fig. 123, which can be bought of any dealer in drawing materials.

163. Fig. 123 represents what is briefly called a scale, but in reality it represents four scales combined in one, namely a 3 inch, $1\frac{1}{2}$, $\frac{3}{4}$ and $\frac{3}{8}$ scale. In the scale marked "3 inch" the space between the line 0 and the line 12 which represents one foot, is divided into 12 equal parts, each part representing one inch; each one of these parts is subdivided into 8 equal divisions; one of these will represent an $\frac{1}{8}$ of an inch. Lines on a drawing are measured with this or any of the other scales in precisely the same manner as any piece of a machine is measured with an ordinary rule. In the scale marked "$1\frac{1}{2}$ inch," the distance between the line 0 and the line 12 is equal to $1\frac{1}{2}$ inch on an ordinary rule, and represents one foot; this is divided into 12 equal parts, and each of these subdivided into four equal parts; one of the twelve equal parts will represent 1 inch, and one of the subdivisions will represent a $\frac{1}{4}$ of an inch. The space between $1\frac{1}{2}$ and 3 inch scales, or between the lines 0 0, is exactly equal to $1\frac{1}{2}$ inch, so that when we use the 3 inch scale the distance from the line marked 12 on one end to the line marked 12 on the other end, will represent 2 feet. Or if we use the $1\frac{1}{2}$ inch scale the distance between the same outer lines will represent 4 feet. In the scale marked "$\frac{3}{4}$ inch" the distance between the lines 0 and 12 is equal to $\frac{3}{4}$ of an inch of an ordinary rule, and will represent 1 foot. So also the distance between the lines 0 0 and 12 in the $\frac{3}{8}$ scale will be equal to $\frac{3}{8}$ of an inch of an ordinary rule, and will represent 1 foot. Each one of these spaces is divided into 12 equal parts, which will represent inches. Each space between the lines marked 0 is exactly equal to $\frac{3}{8}$ of an inch of an ordinary rule, and commencing from the right hand end, when the scales is in a position as shown, the lines of division are marked 1, 2, 3, etc., commencing from left hand end every second line is marked 1, 2, 3, etc. When the $\frac{3}{8}$ scale is used each space between the lines marked 0 will represent 1 foot, and when the $\frac{3}{4}$ scale is used two of these spaces will represent 1 foot. Thus, for in tance, by placing the $\frac{3}{4}$ inch scale near the line marked A we find it to be 2 feet 6 inches long. Or placing the $\frac{3}{8}$ inch scale near the line marked B we find it to be 5 feet 3 inches long. Drawings made by a 3 inch scale will be equal to $\frac{1}{4}$ of the size of the object which they represent. Drawings made by $1\frac{1}{2}$ scale will be equal to $\frac{1}{8}$; those made by the $\frac{3}{4}$ scale will be equal to $\frac{1}{16}$; and those made by the $\frac{3}{8}$ scale will be equal to $\frac{1}{32}$ of the size of the object which they represent. When scales are engraved on both sides of the boxwood then the end of the scale will look like that shown in Fig. 120, and when scales are engraved on one side only, then the end of the scale will be similar in form to that shown in Fig. 125. Scales 1 foot long or 6 inches long can be bought; the former are the most useful, the latter are the cheapest.

Triangular scales of which an end view is shown in Fig. 126 can also be obtained, but we believe that flat scales, engraved on one side only, and as shown in Figs. 123 and 125, are the most convenient to use.

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NEW YORK, FEBRUARY 5, 1887.

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Prejudice in Favor of Imported Goods.

The prejudice throughout this country for imported articles seems to hold out strongly in spite of the recognized excellence of American manufactured goods. How much of this is due to the persistent efforts of anti-protection newspapers to belittle or deride home industries and to extol foreign wares, we cannot say but such efforts put forth in daily doses in papers widely read must have a great influence. No matter how independent in thought a reader may be, the never ceasing reiteration of the points of some dogma or policy perused by him every day must make some impression upon his mind. In holiday season the prejudice for imported goods shows itself to a remarkable degree. Merchants dealing in goods suitable for presents take particular occasion to mention that certain articles are imported and this is often accepted as a sufficient explanation of conspicuously high prices. Of course this leads to deceptions. Paterson silk manufacturers put a French mark on their goods, Trenton pot teries stamp their table ware with English brands and various other manufacturers of fabrics and wares that can hold their own as to quality with the best that is made abroad feel impelled to pursue the same policy. The practice is a decidedly bad one, both for the seller and the buyer. It should be thoroughly exposed by the press. As for machinery and tools there is fortunately no inducement to deceive in this country by using foreign brands. In this line the deception is practiced on the other side of the Atlantic by using American brands. Our machinery makers have brought their products to a high grade of excellence without attempting to use foreign marks, and if makers of other wares, such as silks and crockery, expect to reach any such success they must discard the foolish policy of trying to deceive their customers into the belief that they are buying imported articles.

Bribery by Free Passes.

It is said that a member of Congress who has been accustomed to receive regular passes from railroads, recently applied to the Pennsylvania Railroad for an annual pass. The vice-president replied that it would give him great pleasure to send the pass, but the Inter State Commerce bill, which had passed the Senate and was likely to pass the House, makes the giving of such passes a penal offense, and "we cannot do anything which would evade its provisions." Ten or twelve years ago the State of Pennsylvania adopted a new constitution, which expressly forbids the giving of free passes on railroads. According to the best of public knowledge, the Pennsylvania Railroad has persistently violated that provision, while both the conductors of newspapers and legislators who have been traveling on these illegal passes, have kept very quiet about the infraction of law. What the body politic needs is more independent legislators and more independent newspapers. There is a surfeit of the other kind. If the outcropping of Anarchism in this country is to be effectually suppressed, the first step is to compel powerful corporations and syndicates to obey the laws.

Our imports of machinery for the eleven months ending November 30, 1886, amounted to $1,504,680 against $845,751 for the same period in 1885. The total imports of iron, steel and machinery increased nine and a half million dollars. If importations increased at that rate in spite of a 45 per cent. duty (which the free traders denounce as prohibitive) what would be the result if the tariff were cut down to about 25 per cent.?

If we are to have pools at all, a water pool seems very appropriate. The mills of Minneapolis have formed a pool on water (not in the Wall street manner) and now the power of St. Anthony Falls is distributed more evenly and equitably. There is not water enough to keep all the mills going steadily. Those that have steam engines are independent of the pool. Various industries in other parts of the country that have got tired of depending upon pools of water are putting in steam engines.

How a Leading Broad Street Firm Views the Inter-State Commerce Bill.

The following is an extract from the regular weekly letter mailed to their customers on January 15, 1887, by the well-known stock brokerage firm of Moore & Schley, 26 Broad Street, New York:

The large vote by which the Inter-State Commerce Bill was endorsed by the Senate settles the question that hereafter the Federal Government will be a factor, and an important one, in the general management of our railway system. Undoubtedly some evil will result because of this interference in what has heretofore been under the exclusive management of private corporations. But we adhere to the belief frequently expressed in these circulars, that in the long run holders of securities will be benefited by this Government intervention. The railroad interest is so powerful and so vital to the business of the nation, that the Government must protect and conserve the transportation systems of the country from many of the adverse influences which it has suffered from in the past. It is incredible that any national commission would permanently injure so important and powerful an interest as that represented by the existing railroad corporations. The way the market responded to the news of the passage of the Inter-State Bill by the Senate shows that the street takes this view of the matter.

Chas. F. Peck, Commissioner of Labor Statistics of the State of New York, has submitted his fourth annual report to the legislature. His circulars of inquiry have developed considerable useful information. Nineteen hundred employers were interrogated as to discrimination between union and non-union men. Over two-thirds were indifferent as to the unionism or non-unionism of their employes. Twenty-one preferred Union men, seventy-nine took them under compulsion, while forty-three are non-unionists. "The balance seem to go with the stream, having no preference for or against the matter." Six hundred and sixty-seven strikes were settled by conciliation—not arbitration by calling upon a third party. About half of this number were settled by aid of the union, ninety-four with the employees themselves, and the rest of them in ways that it was difficult to learn definitely. Mr Peck says:

"All the proof this year is to the point that the unions have forced higher wages, and where reductions, actual or threatened, have taken place, the rates have not been to as low a figure as they had been before the increase took place."

Literary Notes.

Henry V. Poor, one of the firm publishing "Poor's Manual of Railroads," sends us a copy of a circular he has prepared to oppose the Inter-State Commerce bill. It contains a lot of tables to show that railroad traffic has enormously increased during the past twenty years, and that passenger and freight rates have gradually been reduced—facts which we have not seen disputed.

As a specimen of Mr. Poor's logic we quote his opening sentence:

"Experience has fully shown that in a country like the United States, where the construction of railroads is open to all, the best results are secured by leaving such works, as to their operations, to the control and guidance of natural laws, to which they are as much amenable as are the other enterprises or industries of the country."

Mr. Poor knows as well as anybody that if railroads were left "to the control and guidance of natural laws," no more railroads would be built for public traffic. The first step in building a railroad is to appeal to law (not natural, but legislative) for a charter granting the right of way and as many special privileges as its promoters can get. The people along the proposed route soon find that the road is far from being restricted solely by the laws that control "other enterprises and industries." Perhaps, however, Mr. Poor means that after a railroad company has secured all the special legislative privileges it can it should forever after be left to the "control and guidance of natural laws," and be exempted from any legislation to prevent abuses of its privileges. If that is his view he will injure the railroad companies more than benefit them by issuing pamphlets.

"LOCOMOTIVES AND LOCOMOTIVE BUILDING," being a brief sketch of the growth of the railroad system and of the various improvements in locomotive building in America, together with a history of the origin and growth of the Rogers Locomotive and Machine Works, Paterson, New Jersey, from 1831 to 1886.

Anything authentic in relation to the early early history of railroading in this country is sure to be read with interest. In putting the preparation of this book into the hands of so accomplished a writer upon this subject as Mr. M. N. Forney, the publishers have added most materially to its interest and to its value.

The author goes back to 1826, in which year the first railroad in the United States was built, so far as he finds authentic accounts. This was nothing more than a tramway, operated by horses and stationary engines. Coming down to 1835, the total miles of railroad in the United States was 1098. It was at this time, or during the year 1835, that Mr. Rogers, then the head of the machine firm of Rogers, Ketchum & Grosvenor, determined to begin the construction of locomotives at Paterson, and commenced to put up buildings for that purpose. Their advertisement, copied from the *American Railroad Journal* of 1836, shows that they were ready for business at that time.

An engraving of the first locomotive built at the works is given. In this locomotive there were several improvements over any previous practice. One of these was the cast-iron wheels with hollow spokes and rim; another counterbalancing the weight of reciprocating parts; for this latter improvement Mr. Rogers filed specifications in July, 1837.

The engraving of the first locomotive is followed by others succeeding it, and descriptions are given of new departures originated at the works or adopted by the company.

Chapter V, on "The Organic Development of the Locomotive" will be found particularly interesting to those who are interested in mechanical progress. It is a long chapter, in which the author concisely sets forth much of the practice and progress in locomotive construction from its beginning to the present time. It is one of the most interesting accounts of the subjects we have ever read, the engravings giving the necessary assistance to an understanding of the text.

The work logically concludes with engravings and dimensions of modern locomotives of the various types built at the Rogers works.

We are not informed that the book is for sale; it will be unfortunate if it cannot have the wide circulation it deserves.

Questions and Answers.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common-sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials nor location will be published.

(39) D. B., Sac City, Iowa, writes: I have a lot of cast scrap iron, and wish to make bells of about 40 pounds weight. What can I mix with this scrap so as to make good bells? *A.*—Thomas D. West says: If the scrap is common machinery, mix with it 50 per cent. car-wheel scrap or No. 2 charcoal iron. If the mixture is remelted before casting into bells, it will be much improved.

(40) B. U., Binghampton, N. Y., asks: Would a worm gear be a practical arrangement to drive the face-plate of a 6-foot boring mill, gear being, say, 4 feet diameter, 92 teeth, double thread, worm running 35 to 1,400 revolutions, or would a single-threaded worm be better? *A.*—You can drive the mill with the worm wheel, but we do not believe it is the best way to do it. There is no objection to the double thread. The pitch seems to be unnecessarily coarse.

(41) L. G. L., Cincinnati, Ohio, asks: What is the best metal for fusible plugs for boilers? *A.*—Banca tin is generally considered the best.

(42) L. A. R., Hamilton, Mo., will find his questions answered in an article, "Setting Valves of Corliss Engines," in the AMERICAN MACHINIST of February 27, 1886.

(43) W. J., New London, Conn., asks: How will solid cast-iron boxes wear on a crank-pin? Will they run hot or cold? Did you ever hear of a marine engine having cast-iron crank-pin boxes? *A.*—We think cast-iron boxes would be very likely to cut the pin and run hot; we have never heard of a marine engine having such boxes.

(44) F. L., Mobile, Ala., asks: Please give me a rule for determining the proper size of suction and discharge pipes for steam pumps at 100 feet piston speed per minute? *A.*—There is no rule for this. If you will look over the list of pumpmakers, you will see that they disagree in these respects. If you make suction pipe not less than ⅓ the area of water cylinder, and discharge pipe ¼ the area, you will be about right, then if the length of pipe is considerable, or if there are bends in the pipe, increase the pipe by one size, or in some cases two sizes.

(45) H. R. H., Scranton, Pa., writes: Our main line shaft is to run 125 revolutions. How can I calculate pulleys to drive machines and countershafts at different speeds? *A.*—Consider one shaft as the driver and the other the driven. Then the revolutions of the driver, multiplied by the diameter of the driving pulley, must equal the revolutions of the driven, multiplied by the diameter of driven pulley. If, for example, you wish to drive a countershaft 250 revolutions from a 24-inch pulley or line shaft, you first multiply the revolutions of line shaft by the diameter of driving pulley; 125, multiplied by 24, gives 3,000. Divide this by the desired speed of countershaft; 3,000, divided by 125, gives 12; that is, you would require a 12-inch pulley on countershaft. The proof is that 125, multiplied by 24, is equal to 250, multiplied by 12. If you wish to drive some machine from the countershaft, proceed in the same way; considering the countershaft the driver, you will readily see how this can be reversed. Take the same example: Your countershaft is to run 250 revolutions, and has a 12-inch pulley. Multiply 250 by 12, which gives 3,000; divide this by 125 (the speed of line shaft), and you get 24 inches as the diameter of the pulley on line shaft.

BUSINESS SPECIALS

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Shafting Straighteners. J. H. Wells, Tampa, Fla.

J. Clayton, Air Compressors, Rock Drills, 43 Dey st, NY

Edw. Sears, Wood Engraver, 169 William st., N.Y.

Steel Name Stamps, etc. J. B. Roney, Lynn, Mass.

Metallic Pattern Letters and Figures to put on patterns for castings. Knight & Son, Seneca Falls, N.Y.

N. B. Non-breakable Drills and Taps. A. P. Brown, 108 Liberty st., N. Y.

Solid Nickel-Seated "Pop" Safety Valves. Consolidated Safety Valve Co., 111 Liberty st., N. Y.

The Best Upright Hammers run by belt are made by W. P. Duncan & Co., Bellefonte, Pa.

Light articles built to order by the American Sewing Machine Co., Philadelphia, Pa.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Selden Packing, for stuffing-box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., NY

Davis Key-Seating Machines, kept in stock, by Manning, Maxwell & Moore, 111 Liberty st., N. Y.

Pattern and Brand Letters. Vanderburgh, Wells & Co., cor. Fulton and Dutch sts., New York.

20", 25," 28" B G. and S. F. upright drills for immediate delivery. Currier & Snyder, Worcester, Mass.

Ice and Refrigerating Machines. 120 built, and all successful, by David Boyle, 521 Monroe, Chicago, Ill.

Wanted—Tool agents in shops; outfit free. E. H. Randall & Co., 154 Lake street, Chicago, Ill.

Robbs' Patent Composition for case-hardening; send for circular. F. W. Tasney, Paterson, N. J.

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 93 John st., N. Y.

20,000 addresses of steam users and users of mach. in 10 States, $10. J. N. Mills Pub. Co., 30 Vesey st., N.Y.

Steel Stamps by mail, 13c. a letter; figures, 80c.; and letters, $2.25 a set. Acme Tool Co., 16 Jennings avenue, Cleveland, Ohio.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocum & Son's Shafting Works, Drinker st., Philadelphia, Pa.

The Improved Tabor Steam Engine Indicator, made and sold by The Ashcroft Mfg. Co. 111 Liberty st., N. Y.

Engine Lathes, Hand Lathes, and other fine tools, Assortment large; prices low. Frasse & Co., 92 Park row, N. Y.

Machinists' supplies, brass goods m'f'rs supplies, polishing materials, all kinds wire, metals, etc; in any quantity. Jordan & Gottfried, 208 Canal st., N.Y.

Handbook on the Care of Boilers. 50c. Descriptive Circular and Catalogue of Books for Mechanical Engineers free on application; special terms to Mechanics Libraries. E. & F. N. Spon, Publishers, 35 Murray st., New York.

St. John Improved Self-adjusting Cylinder Packing, for marine and stationary engines and locomotives; applicable to water, air, oil and ammonia pumps. For durability and minimum of friction, it is unexcelled. Send for pamphlet. Address, Balance Valve and Piston Packing Co., room 58, 280 Broadway, New York.

Patent Binders for the AMERICAN MACHINIST, holding a complete volume (52 issues), simple, neat, durable. Price, $1, prepaid, to any part of the United States by mail. To Canada or foreign countries the price will be 75c.; purchasers pay express charges and customs duties. AM. MACHINIST PUB'G CO., 96 Fulton st., N. Y.

"Indicator Practice and Steam Engine Economy." By F. F. Hemenway. Contains plain directions for using the indicator, and making all required calculations from the diagram; also the principles of economy in operating steam engines, and current practice in testing engines and boilers. Price, $2 post-paid. Published by John Wiley & Sons, 15 Astor Place, New York.

MANUFACTURES

F. A. Gardner & Co., Catskill, N. Y., are building a new foundry.

Lewis S. Jones contemplates starting chain works at Wheeling, W. Va.

The Weber Wagon Company, Auburn, Ill., will build a $12,000 factory.

A company is being organized, it is said, to build large pipe works at Anniston, Ala.

W. T. Crane & Co., of Owatonna, Minn., will erect a large machine shop and foundry.

A cotton factory is to be erected at Athens, Ala. John L. Tanner is interested.

Martin Seiple, of Quakertown, Pa., will build a large addition to his carriage factory.

J. & M. Haffen will build a four-story brick factory, 26x51 feet, on 152d street, New York.

Schaffer & Co., Cincinnati, O., will erect a new five-story factory of brick and freestone.

It is reported that the Ohio and Mississippi Railroad will locate shops at Washington, Iowa.

A new cotton mill will be built in Columbus, Ga. G. G. Jordan and A. R. Young are interested.

T P. Cowan & Co. are making arrangements to build a machine shop at Maryville, Tenn.

Meehan & Scott will erect a large steam forge at Chattanooga, Tenn. A site has been secured.

The North Birmingham Land Company, Birmingham, Ala., propose to erect a rolling mill.

G. C. Miller and A. C. Dow, Lincoln, Ill., are erecting new buildings to be used as a foundry.

John Miller, recently of Booth, Miller & Co., Youngstown, O., will erect a large iron foundry.

E. P. Allis & Co., Milwaukee, Wis., will rebuild their foundry lately burned. It will cost $25,000.

The Atlanta Cotton-Seed Oil Mills, Atlanta, Ga., contemplate enlarging and improving their mill.

A fire destroyed the brass foundry on Mason street, Nashua, N. H., owned by G. A. Rollins & Co.

The Southern Central Railroad Company will remove its machine shops from Auburn to Sayre, Pa.

The Eureka Fire Hose Company, of Jersey City, N. J., will erect a three-story factory on Wilkinson avenue.

An English firm has just sent an order by cable to a Hartford firm for fifty automatic screw machines.

Peter Terwilliger, 53 S. Clinton street, Chicago, will erect a six-story factory on Clinton street, to cost $25,000.

It is probable that a stock company will be organized at Roanoke, Va., soon, to establish a basic steel plant.

The Celluloid Novelty Company, Ashbridge street, Newark, N. J., will erect a one-story machine shop on Ashbridge street.

The Kentucky and Indiana Bridge Company, Louisville, Ky., will build a new round-house at 31st and Main streets.

The Dowling Furnace Company, Chattanooga, Tenn., have secured a site for their blast furnace, and will proceed to erect it.

A new cotton manufactory, to employ 100 hands, will be built in Newport. C. M. Emerson and F. W. Cutting are interested.

G. W. Smith, of Uxbridge, Mass., has purchased the woolen mill in Windsorville, Conn., and will make extensive improvements.

It is reported that the St. Louis, Iron Mountain and Southern Railroad Company will enlarge its machine shops at Little Rock, Ark.

A $100,000 stock company is being organized at Birmingham, Ala., to establish a large carriage and wagon factory. E. A. Richards is interested.

The Beacon Valley Rubber Company, of Naugatuck, Conn., is looking for a site on which to erect a factory to replace their factory recently destroyed by fire at Cotton Hollow.

It is computed that no less than a hundred mills, factories and workshops are to be erected in Pittsburgh this year. Many parties are coming to that city to get the benefit of natural gas fuel.

The Peoria Pipe Manufacturing Company, 242 South Third street, Philadelphia, will build pipe works on Seventeenth street, near Pennsylvania Railroad.

R. G. Pentecost, architect, 177 La Salle street, Chicago, is preparing plans for a four-story factory, 50x200 feet, to cost $30,000. It will steam and heat two elevators.

Davis & Rakin, 24 Milwaukee avenue, Chicago, will erect a five-story brick factory, corner Peoria and Lake streets, to cost $80,000. Clarence L. Stiles 84 La Salle street, architect.

The Superintendent of the Wooster (Ohio) Co-operative Foundry reports that the association is self-sustaining, with the trade steadily increasing and all of the members satisfied.

The Forest City Malleable Iron Company, of Cleveland, have selected a site and will erect new works on Todd street. The works will be completed in the spring, and will employ 150 men.

The Springvale (Maine) Cotton Mills Company is the name of a new concern recently organized by parties in New York city, with a capital of $100,000. Mr. Jas. O. Bloss, 45 Williams street, New York city, is one of the movers in the enterprise.

The Morris Building Company, of Brooklyn, N.Y., will erect a brick factory, 144x95 feet, on Willoughby avenue, near Grand avenue. It will cost $37,000. It will contain foundry, machine shop and forge shop.

The Paper Box Manufacturing Company, of Middletown, Conn., will move its factory to Old Saybrook, Conn. That town, at a special meeting, agreed to exempt the company from taxes for ten years.

Extensive improvements are to be made in the plant of the Falcon Foundry and Machine Works of Youngstown, O., comprising additional buildings' cupolas and machinery, by which the capacity of the works will be greatly enlarged.

The Burdett-Smith Company has been chartered to manufacture and sell stoves, with a capital of $300,000; term of existence, 21 years, and these trustees: W. Stone Smith, Edward A. Burdett, Peter Black, with principal office in Troy, N. Y.

January 8 the Ohio Southern Railroad Machine and Car Shops at Springfield, O., were destroyed by fire. Six locomotives and two cars of valuable machinery and the buildings were burned. Loss, $140,000; fully insured.

The Woodstock Iron and Steel Company and the Anniston Land and Improvement Company, Anniston, Ala., will erect two blast furnaces, each of 1,000 tons weekly capacity. Samuel Noble, of that city, is interested in both companies.

The Lane & Bodley Company, of Cincinnati, have been awarded the contract for a pair of 24x60 Corliss engines, four boilers, cable driving and tension machinery, a complete plant for two cables for the Mt. Auburn cable railroad of that city.

It is reported that B. F. Roden, R. J. Terry, J. V. Richards, J. T. Terry, Sr., of Birmingham, Ala., and others have formed a company, with a capital stock of $1,000,000, to build a coke furnace, rolling mill, etc., near Anniston. They have bought a large tract of land.

The Presque Isle Machine Shop, Presque Isle, Me., has received large additions to its equipment since it passed into the possession of Johnson & Phair. The new proprietors have decided to increase the plant in the spring by building a substantial foundry.—*Industrial Journal.*

The Holly Manufacturing Company, of Lockport, N. Y., sends out a neat calendar for 1887, and a circular giving performances of their Gaskill pumping engines. The average duty of one of these engines of 5,000,000 gallons capacity at Saratoga was over a hundred and four million foot-pounds for three years.

The Nichols & Shepard Company, of Battle Creek, Mich., has been incorporated. Capital stock, $250,000. E. C. Nichols, David Shepard, Battle Creek, and H. H. Taylor, Chicago, Ill., corporators. The company succeeds the firm of Nichols and Shepard, manufacturers of agricultural implements.

The Toledo Foundry and Machine Company, Toledo, O., whose specialty is the manufacture of excavating machinery, are about to build a new brick and iron machine shop, of much larger dimensions than their present frame shops, when they will increase their working force from 42 to 150 men, and their output correspondingly.

The Manufacturers' Aid Association, of Little Rock, Ark., was organized last week, and $2,500 stock taken at the first meeting. Its object is to establish manufacturing enterprises. The directors are P. K. Roots, E. W. Gibb, John F. Boyle, E. V. Denell, C. T. Walker, Nick Kupferle and Jos. Mitchell.—*Industrial Gazette.*

The Patterson mill, one of the largest cotton factories in Chester, Pa., the property of the General Patterson estate, was sold last month to a company of Chester capitalists, of which J. Newlin Trainer is president. The new company will put in some new machines, and have the place in operation by May. They will make cotton cloth, and employ over 300 hands.

A syndicate of Atlanta and Richmond capitalists has just been formed for the erection of two 150-ton iron furnaces at Oxanna, in the center of the Alabama coal and iron regions, on the crossing of the Georgia Pacific and the East Tennessee roads, adjoining Anniston. These furnaces will cost $380,000. Other large works are also projected.

The Manchester Locomotive Works within a few days have received an order for thirty locomotives for the Atchison, Topeka and Santa Fe Railroad, an order for nine locomotives from the Boston and Lowell road, and other orders from the Concord and Minneapolis and St. Louis railroads. These orders alone will keep the works busy, with increased help, until July.—*Railway Review.*

The Minnesota and Northwestern Railroad Company has ordered 36 new passenger and freight locomotives. Several of the new passenger engines will weigh 100,000 pounds, have cylinders 19x24, and driving wheels 5 feet 10 inches in diameter. These will be the largest passenger engines in use west of the Mississippi.

The Walker Mfg. Company, Cleveland, have recently built a new office, with large fireproof vaults, at their works on the lake shore. The entire grounds, comprising several acres, have been surrounded by an eight-foot tight board fence, which they utilize for signs. The works are well employed.—*Iron Trade Review.*

One of the indications of prosperity among Connecticut manufacturing concerns is an increase in the number of working hours at the factory of Sargent & Co., at New Haven, where 1,500 hands are employed, and the starting up of the Candee Rubber Works with about 1,200 employes. At Waterbury the numerous factories have had a season of unusual prosperity.—*Boston Commercial Bulletin.*

The Decatur Land, Improvement and Furnace Company has been organized at Decatur, Ala., with a capital stock of $7,500,000, by E. C. Gordon, of Athens, Ala.; Walter S. Gordon, J. D. Roquemore, Montgomery and others. It is stated that the company will build four blast furnaces, gas and waterworks, etc. The charter of the company allows it to engage in any or all kinds of manufacturing.—*Baltimore Manufacturers' Record.*

The Whitehill Engine Works, Newburgh, N. Y. report business and prospects good. They are now putting in a 20x42 inch Whitehill-Corliss engine and two 60 inch x 18 ft. horizontal tubular boilers for Feeney & Devaney, 318 E. Twenty-third street, New York. Included in recent sales within the past month, orders have been closed for two 16x36 inch engines from Fraenheim & Billsack, brewers, Pittsburgh, Pa., to drive refrigerating machinery; one 14x30 inch engine, from A. & A. Quandt, Troy, N. Y.; one 16x36 inch engine and two horizontal tubular boilers, from T. & G. Peck, Haverstraw, N. Y.; and one 16x30 inch engine and one 85 horse-power boiler, from Theodore Fredericks, also of Haverstraw.

The Mason Regulator Company, Boston, Mass., write us: "We have recently applied one of our Mason reducing valves on the steam yacht Meteor. They reduce the steam pressure from 200 pounds to 10 pounds for heating purposes. Among our sales of reducing valves recently are New York Dyewood and Chemical Co.; Bartelle & Renwick; Adams & Co., Brooklyn; Eureka Steam Heating Co.; Lang's Brewery, Buffalo; New Bedford Electric Light Co.; J. Hemssler, Newark. We have also applied some of these valves to locomotives for car heating. A number of railroads are adopting this system, in order to prevent fire in case of accident."

The Cleveland Shipbuilding Company, Cleveland, O., are about to begin operations, and some contracts have been taken. They have bought the Cuyahoga Works, the Powell Tool Company and some other property, and most of the ground will be cleared for use as a shipyard. The *Leader and Herald* says: "O. N. Steel will be superintendent of the machine shop; Mr. Quincy Miller, late engineer on the steamer J. H. Devereux, will be superintendent of the boiler department; and Mr. J. C. Wallace will have charge of the drafting. Thomas D. West, for many years connected with the old Cuyahoga Works, will be at the head of the foundry department. The company has at present 100 men in their employ, most of them engaged in the building of a big blast furnace engine."

The Peerless Mfg. Co., Louisville, Ky., write us: Knowing the interest you take in enlargements of works, etc., we would report that the growth of our business has compelled us to add another one hundred feet to our moulding department, with the prospects of further additions before the end of the year. In order to utilize our Rice sand moulding machines, we are preparing to go extensively into the manufacture of grates and fireplace settings for all styles of mantels. Our plant for this branch is the most complete of its kind, and comprises everything that is new or labor-saving in machinery and appliances. We will start into the spring trade with patterns and designs that are entirely new and very attractive, everything being finished in the best style. This department of our business will be managed by Mr. W. E. Fitch, who has a national reputation in this line of goods.

The M. C. Bullock Manufacturing Company, of Chicago, report recent shipments as follows: To John McDonald, Iron River, Mich., one double cylinder portable hoist; to the Beacon Publishing Co., Akron, Ohio, one 56 horse-power straight-line engine, also one large exhaust fan; to the First National Mining Co., Hurley, Wis., one 50 horse-power boiler, one 14x20 engine, and two 5 ft. Lane patent band friction drums; to the Blue Jacket Mining Co., Hurley, Wis., one 45 horse-power boiler, one 14x20 engine, and two 4 ft. Lane patent band friction drums; to David Boyle, Chicago, one 5-ton ice machine; to the Goss Printing Press Co., Chicago, one 8-page perfecting press for Grand Rapids, Mich., and one 4-page perfecting press for Kansas City, Mo.; to J. B. Maas, Negaunee, Mich., one Maas patent rock drill and outfit; to the South Range Co., Ironwood, Mich., one Bullock Little Champion diamond drill, with complete outfit for exploring for iron ore; to the Iron King Mining Co., Hurley, Wis., one 6 ft. standard Lane patent hoisting drum.

Machinists' Supplies and Iron.

NEW YORK, Jan. 20, 1887.

Pig iron continues strong, and prices look upward. Those who have made contracts ahead for foundry iron are experiencing the benefits of their business sagacity. Large Lots of No. 1 Foundry can be bought from furnaces at $21 a ton, but the smaller lots sold by dealers command $21.50 to $22.50, according to circumstances.

There is something of a scarcity of good brands of foundry iron for immediate delivery. We quote No. 1 X, $21 to $22; No. 2 X, $19.50 to $20.50; and Grey Forge, $17.50 to $18.

Scotch pig has also reached higher prices on the other side of the Atlantic, but consumers here are not very ready to pay the advance. Coltness sells at $24; Gartsherrie, $23; Summerlee, $23.50; Eglinton, $21; and Langloan, $21.50 to $23.

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"Situation and Help" Advertisements only inserted under this head. Rate, 30 cents a line for each insertion. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

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Young man with general knowledge of machine and foundry business—understands drawings thoroughly—desires a position as salesman or solicitor of castings and contract work; near New York city preferred. Address E. B., AM. MACHINIST.

Wanted—A first-class general foreman for a machine shop in N. Y. city employing about 30 men: must be a thorough mechanic and live man up to the times, strictly temperate and experienced in the proper management of men; state full particulars as to age, experience, reference and compensation expected. Address C J., AM. MACHINIST.

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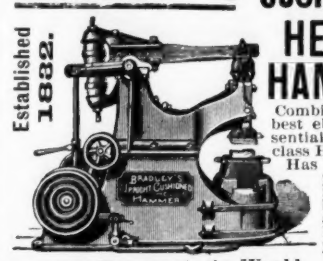

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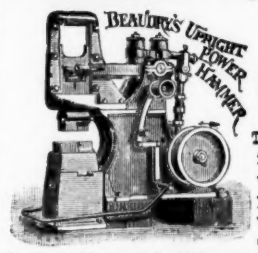

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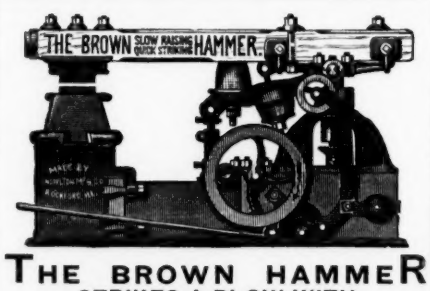

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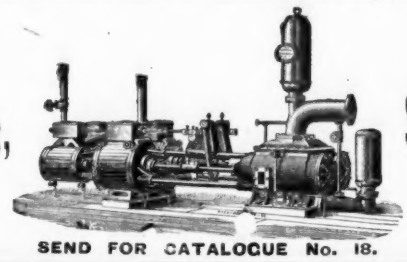

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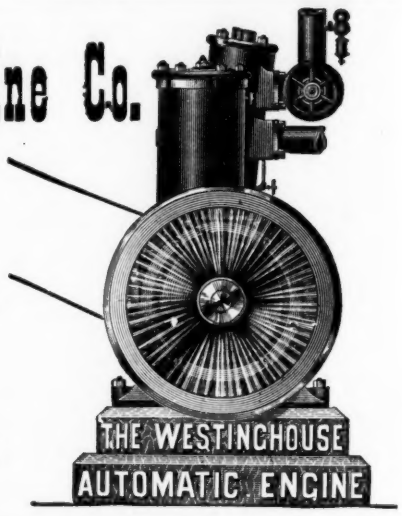

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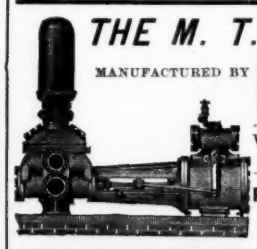

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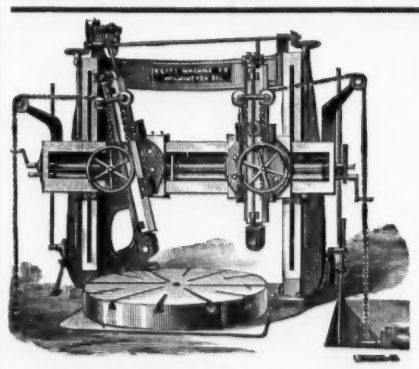

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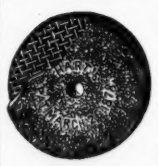

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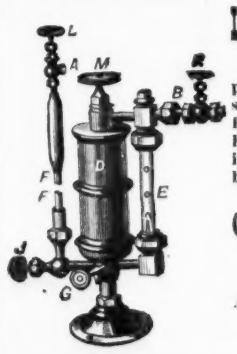

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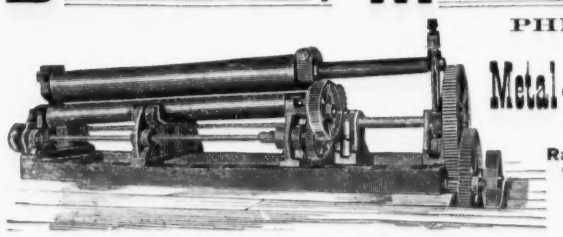

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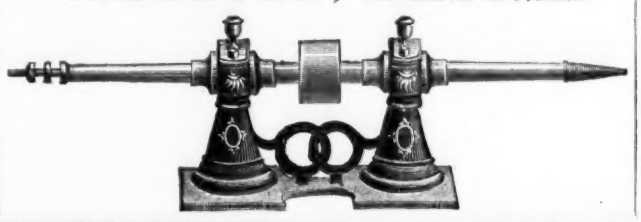

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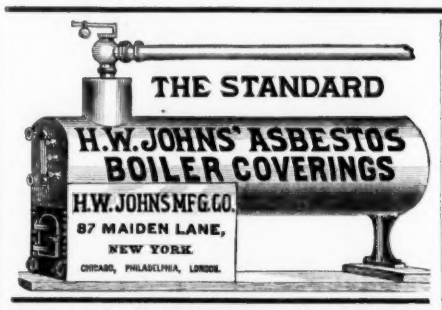

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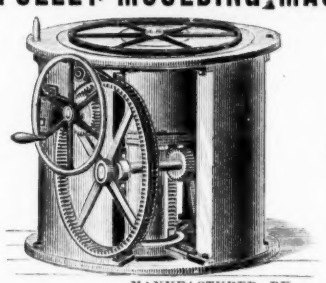

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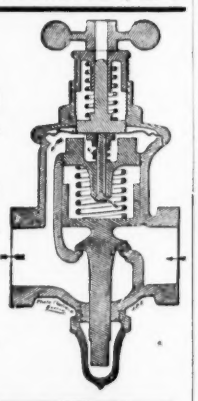

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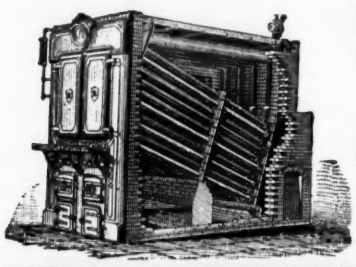

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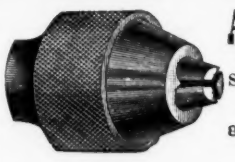

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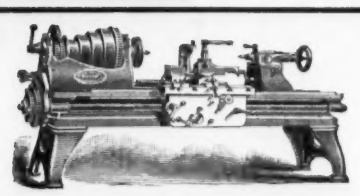

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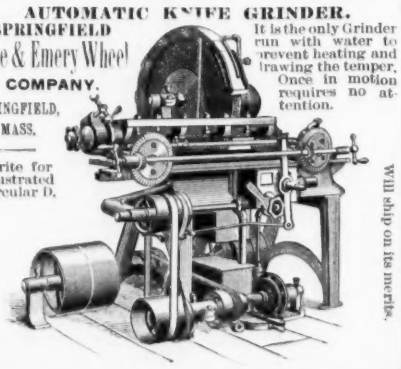

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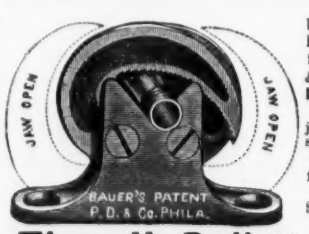

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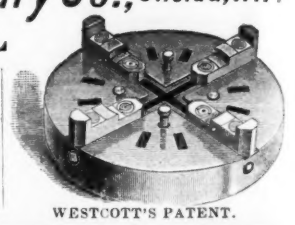

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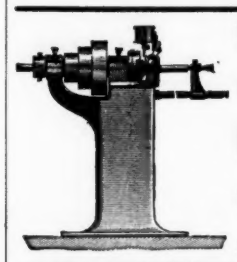

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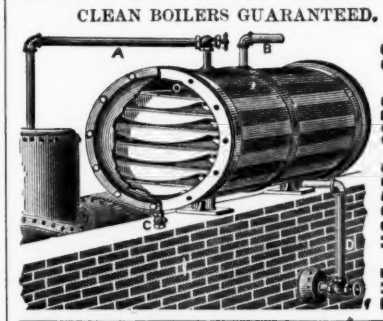

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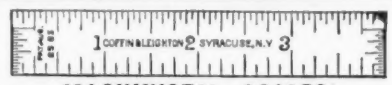

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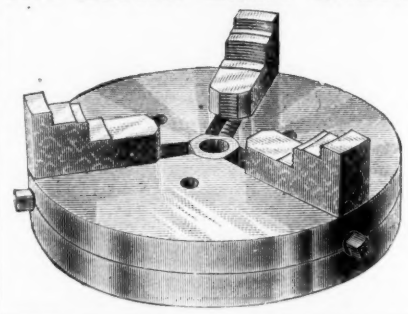

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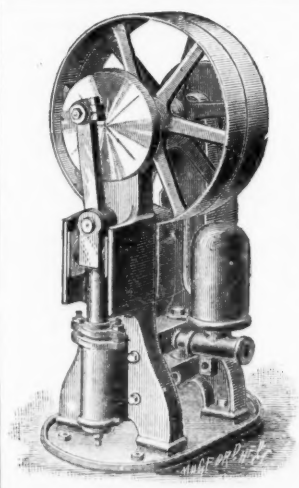

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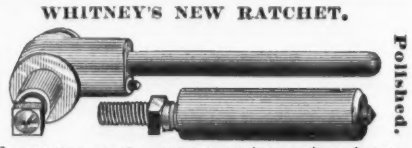

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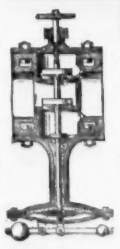

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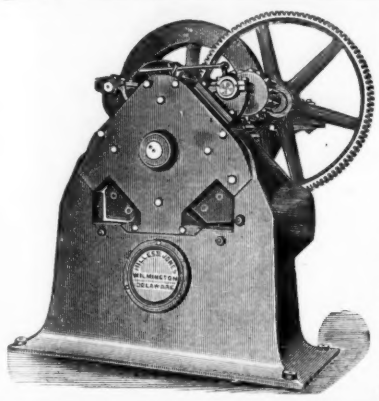

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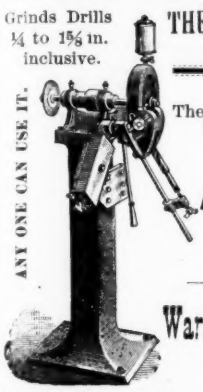

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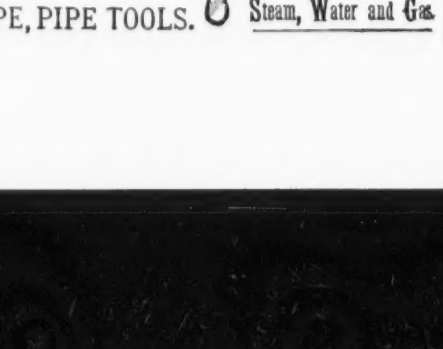

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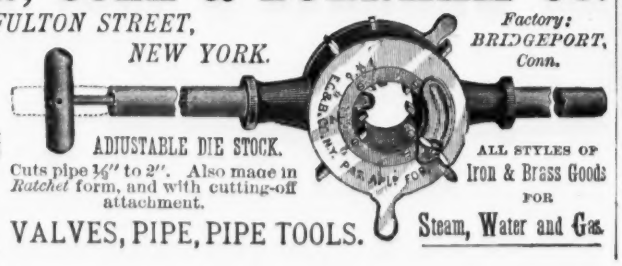

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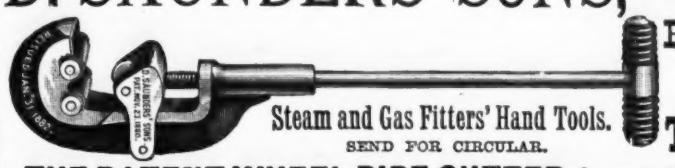

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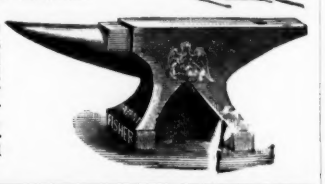

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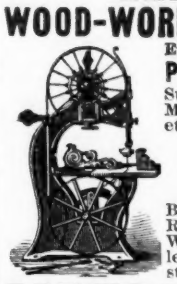

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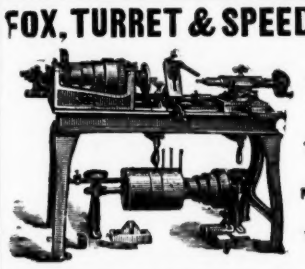

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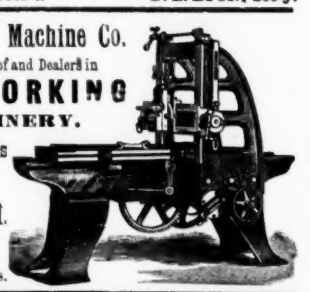

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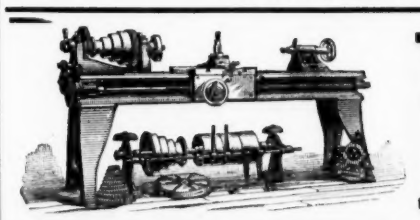

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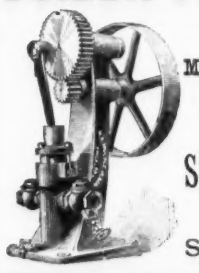

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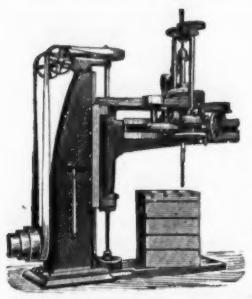

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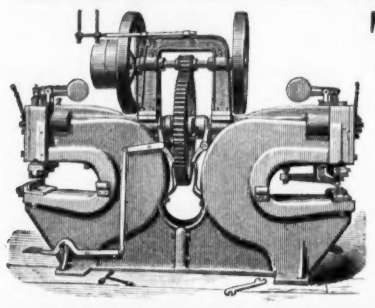

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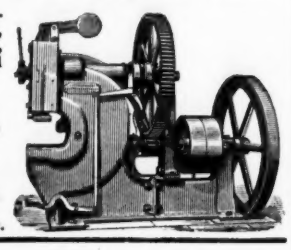

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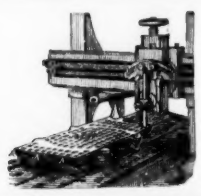

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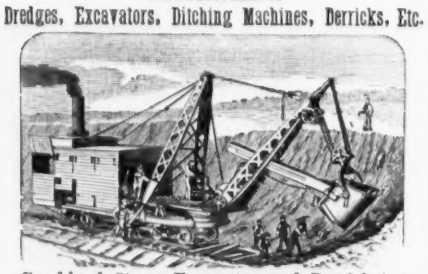

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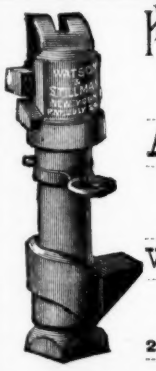

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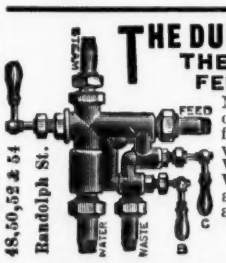

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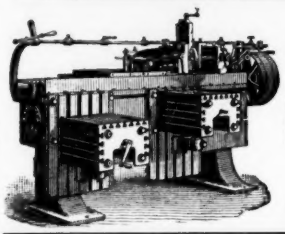

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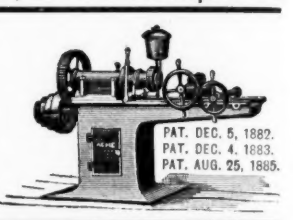

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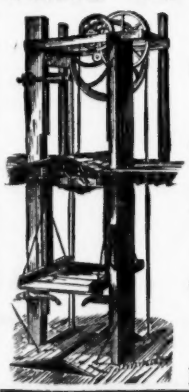

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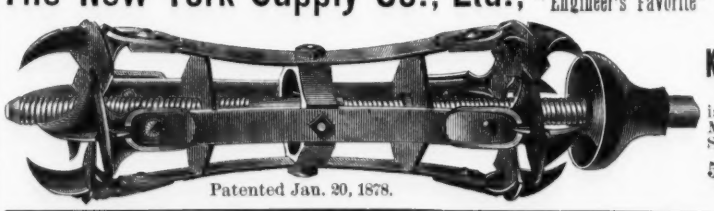

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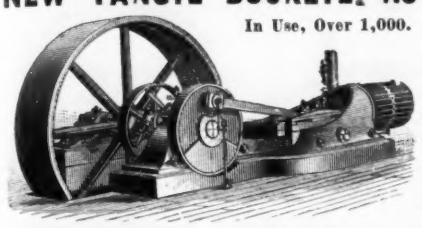

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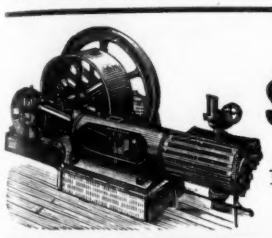

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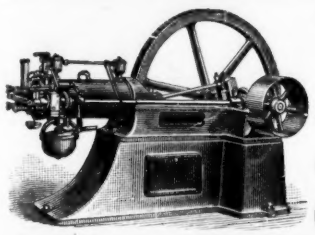

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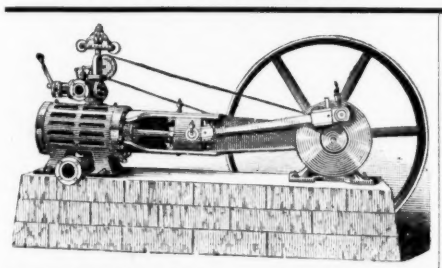

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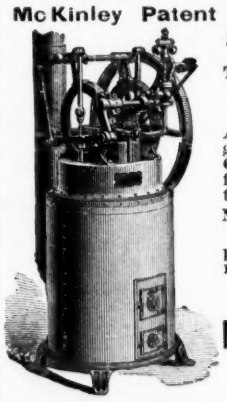

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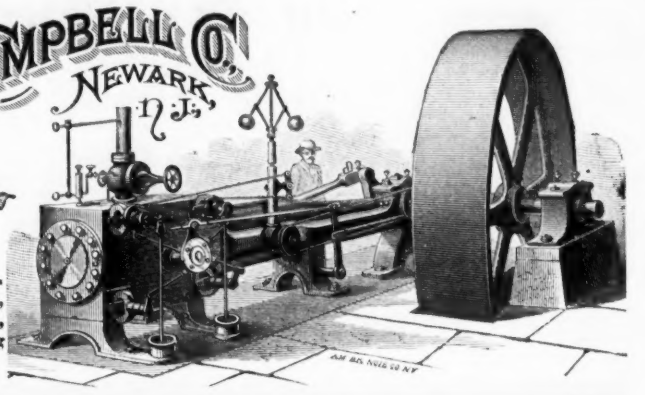

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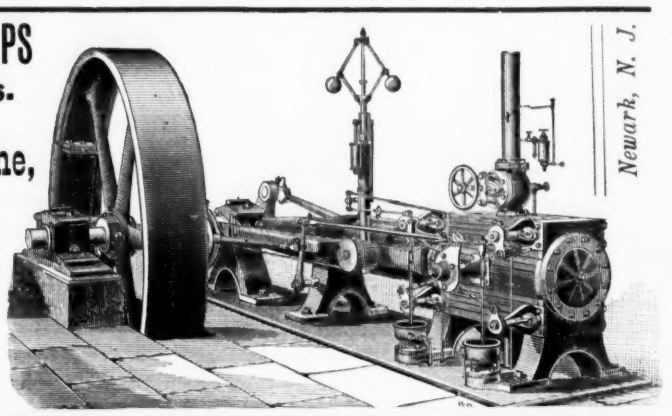

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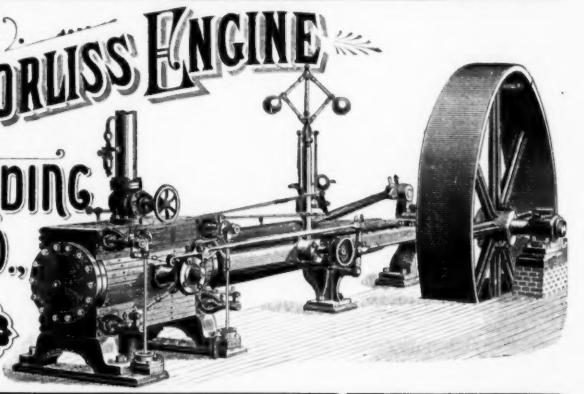

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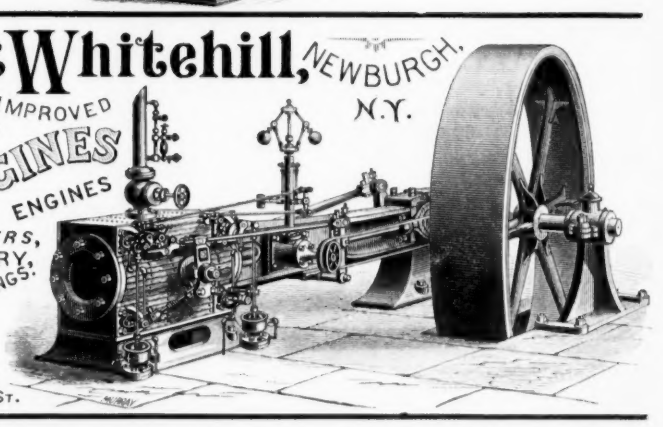

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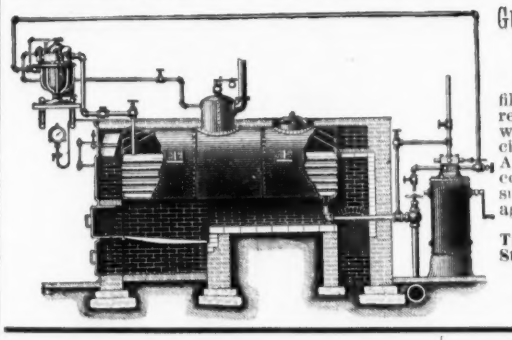

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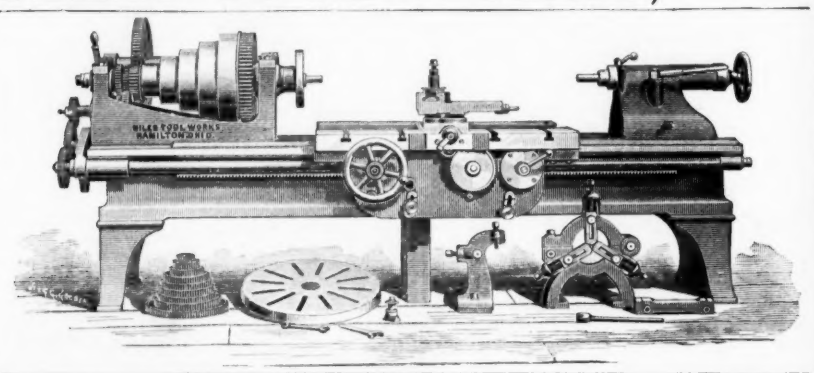

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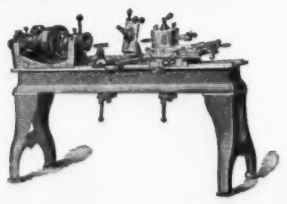

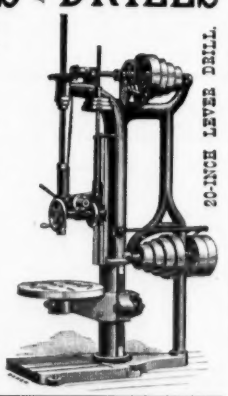

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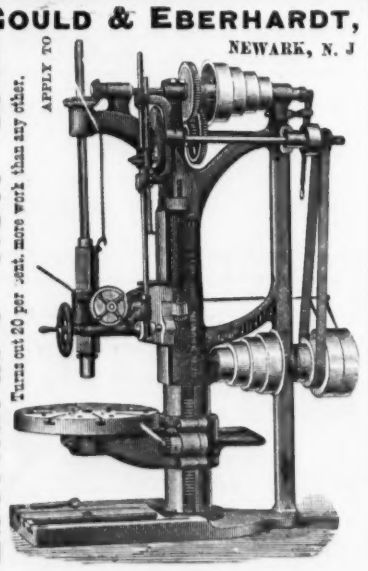

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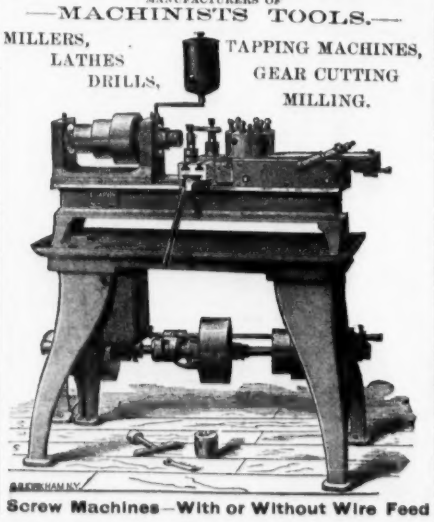

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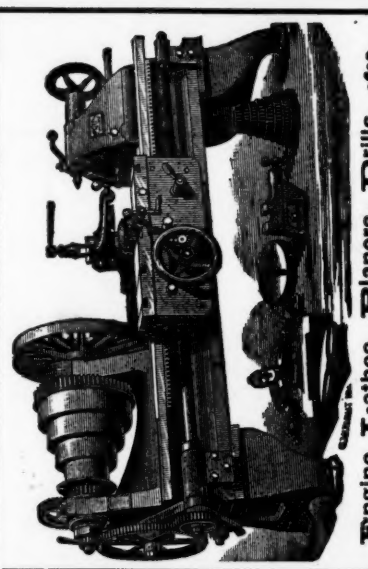

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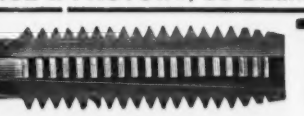

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